GREYS RIVER
LANDSCAPE SCALE ASSESSMENT

BRIDGER-TETON NATIONAL FOREST

Lincoln County, Wyoming

2004

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

Overview and Purpose

The purpose of the Greys River Landscape Scale assessment is to provide a landscape perspective of the resources, and their uses, in the Greys River Watershed. This approach allows consideration across the landscape of influences from natural processes, and identification of changes in the past 100 to 150 years. Further, the needs and desires of humans will be considered in conjunction with the biological and physical capabilities of the land. One outcome of this landscape assessment process will be an ecosystem-based view, or a better understanding of how individual resources and uses fit into the "big picture."

The Greys River Landscape Assessment is not a decision document. It is intended to provide an interdisciplinary view of the project area, in order to set the stage for future, site-specific projects. Prior to implementing any proposal, individual projects must go through the process outlined in the National Environmental Policy Act (NEPA). No decisions are being made for any State, local (town or County), or private lands. Although adjacent, non-Forest Service System Lands were considered in the assessment to give a more complete picture of influences to, from, and within the watershed, recommendations and/or management opportunities will apply only to lands administered by the Forest Service**.**

The Landscape Scale Assessment is meant to be a dynamic document. Additional material may be added to this assessment as further information is gathered and assessment steps are developed. Additional materials should be labeled as "Supplement" and dated within the header of each page.

Assessment Process and Organization

This landscape assessment was completed by a core interdisciplinary team, with additional information supplied by an extended team of resource specialists. The approach used by the core team included:

- Determining historic conditions within the project area using existing data and knowledge (Chapter 1),
- Presenting existing or current conditions (Chapter 2), and comparing these with historic conditions,
- Articulating an integrated set of desired conditions consistent with Forest Plan direction (Chapter 3), and

- Drafting management opportunities using information gained throughout the analysis process, taking into consideration issues and concerns (Chapter 4).

- The final section contains appendices and references.

The broad-scale effects of current management on the landscape were evaluated. Existing information used in the assessment process was compiled from previous inventories and is available in the BTNF GIS Data Library. This information includes: Soil and Geology, Hydrography, Topography, Transportation, Vegetation, Recreation, Disturbance, Climate, and Oil and Gas.

Existing and reference conditions, desired conditions, and management opportunities are presented by resource area. Many of these conditions and opportunities apply to more than one resource (e.g. elk grazing affects stream channels, recreation, vegetation patterns, and fire potential). The intent of this document is to take into consideration the effects that actions and natural events have across the watershed, rather than just on one resource area.

The Assessment process will yield 5 basic products, as follows:

1. a characterization of existing and reference conditions, including the historic range of natural variation, from which to gauge trends;
2. a list of proposed amendments to Bridger-Teton National Forest Land Management Plan (Forest Plan) direction pertaining to the assessment area;
3. a list of further inventory needs in order for the knowledge base to complement proposed activities;
4. a list of monitoring needs necessary to accurately understand the successes or failings of current management activities;
5. an integrated series of management proposals that will restore, maintain, and enhance the watershed's ability to be resilient in the face of continual disturbance, both natural and human-caused.

Overview of the Assessment Area

The 5th order Greys River watershed is the boundary for the assessment area encompassing 290,000 acres 7 miles east of Afton, Wyoming and 1 mile east of Alpine. The crest of the Wyoming Range defines the eastern boundary and the base of the Salt River Range forms the western boundary. Middle Ridge separates the Little Greys River from the main Greys in the northern part of the area (see Map 1.1, Map of the Assessment Area). On a per mile basis of river length, the Greys River is the longest undammed river in Wyoming and drains more water than any other watershed in Wyoming.

MAP 1.1 Map of the Assessment Area

Elevation ranges from 5,700 feet at Alpine to 11,393 feet at Wyoming Peak. Average annual precipitation ranges from about 18 to 55 inches. Approximately 30 percent of the precipitation falls in the winter in the form of snow with over 300 inches of total accumulation. In the spring, the snowpack melts in a short period of time producing peak flows on the Greys River and its tributaries.

The geologic structure of the assessment area is characterized by two major thrust faults which form the Wyoming and Salt River ranges. Geologic strata are primarily Paleozoic and Mesozoic aged sandstones, shales, limestones, siltstones and dolomites. The Greys River valley separates the two ranges and is filled with Quaternary age alluvial deposits which form alluvial fans and terraces. Landslide deposits are commonly found at the base of the adjacent slopes. Tertiary age fanglomerate deposits that eroded from the Salt River Range form high benches (pediments) that sit several hundred feet above the valley floor. Cirque basins formed by localized mountain glaciation occur above the pediments on the east slope of the Salt River Range and often contain small lakes, such as Lake Barstow.

The drainage pattern is typically trellis with major stream confluences occurring at right angles to the Greys River. Stream dissection is generally high, as evidenced by narrow floodplains and oversteepened valley walls. In many areas, active downcutting accentuates slope stability problems resulting in increased mass movements. Mudflows, earthflows and some slumps occur predominantly on slopes of finer textured Mesozoic rocks in dip slope positions. Along the steep valley walls, debris flows of rock and mud extend onto the valley floor. In the winter, these steep valley walls are where abundant avalanches uproot large trees and earth to form avalanche chutes.

A combination of topography, geology, aspect, slope, soils, and climate provide for an ecologically diverse mosaic of vegetation patterns and communities. These vegetation patterns include willow/sedge riparian-wet meadow complexes, sagebrush/grass habitats, mountain shrub, tall forb, aspen, lodgepole pine, mixed-conifer, and alpine tundra-like communities. The most extensive tall forb communities on the Bridger-Teton National Forest, and diverse willow communities (i.e. up to seven willow species in one area), are found in the Greys River watershed.

Overview of Alterations to the Landscape

The Greys River watershed has a rich history of human travels and occupation. People have explored and exploited these mountains for centuries, beginning with prehistoric American Indians. Carved stone points show that early people hunted on the highest peaks of the range. Some artifacts may be as old as 10,000 years. The evidence left by prehistoric people suggests they occupied the area seasonally, to gather and process plants, and to hunt. There is no evidence of year-round occupation or manipulation of habitat.

Explorers and trappers followed the old Indian trails from the earliest expeditions. These trappers left their mark on the Greys River watershed by the names they gave--usually their own--to peaks and streams. Although the Lander Cutoff (part of the Oregon Trail), surveyed in 1857 by Frederick Lander, saw thousands of immigrants pass through the region on their way to the Oregon territory, settlement came late to the region. It was not until 1879, when Brigham Young dispatched his

followers to establish colonies, that anyone lived year-round in Star Valley. The names of pioneer families adorn the map of the Greys River watershed. Many of the creeks and canyons bear the name of the people who settled at their mouths. Hard winters and isolation kept the growth of settlement slow until well into the twentieth century, when dependable roads were built.

The Lander Cutoff brought immigrants into the area and beyond. Some of them brought livestock, which mostly grazed in the lush valley floors. In the1890's, grazing in the mountains began. By the turn of the century, sheep were being herded into the mountains for the summer from Utah, Idaho, and the Wyoming deserts. In 1897, pioneering sheepman A.A. Covey reported grazing his herd in upper Cottonwood and Swift Creeks, on ranges that looked like no sheep had ever grazed there before. The following year he moved to the east slope of the Salt River Range and the Wyoming Range, where he found conditions uncrowded and feed plentiful. Then, he states, "In 1900, the whole situation changed when Tom Kinney brought 100,000 head of ewes into the Cokeville country." By 1901-02, competition between local and regional sheepmen, and between sheep and cattle interests, flared. Gone were the ungrazed basins, and gunfights were said to be common. The range belonged to whoever got there first in the spring.

Timber has played an integral role in the history of the Greys River watershed. Tree-cutting began with the early settlers, and for many decades supported small, local mills. By the mid-1960's, the area's major mill was located in Afton and most of the smaller ones had closed. During the 1960's and 70's, approximately 20 million boardfeet per year were logged in the watershed, mainly on the forested benchlands above the river.

Active fire suppression also began during the early 1900's and continues today with some modification. The attempt to remove fire from the landscape has reduced an important disturbance process from the landscape. Until 2004, the entire analysis area was considered an "appropriate suppression area" where all unplanned ignitions must be suppressed using the "least cost plus loss principle." This was a modification of the 10 am policy (all fires must be controlled by 10 am on the following day) that was in effect from 1910 through the early 1970's. Up to now, fire suppression has been relatively successful at keeping some moderately-sized fires contained. Eight fires exceeding 500 acres have burned since 1910. Fire suppression has probably had the effect of preventing some fires from becoming large, stand-replacing events. A limited amount of prescribed burning has been undertaken during the past 5 years.

Coal mining was a small-scale venture in the area, as recently as the 1980's. Coal mine debris and structures can be seen in Deadman and Blind Bull Creeks, as well as the McDougal Pass area. Coal was transported by truck and supplied to people living in the Greys River and Alpine area.

During the late 1970's and early 1980's, the entire drainage was covered by seismic exploration for oil and gas resources. Hundreds of miles of line, utilizing explosives and sensor cables, was laid out by helicopter and ground operations. Exploratory wells were drilled in the Murphy Creek, Crow Creek, and Marten Creek drainages. Those wells were never put into production but were instead capped, with the sites revegetated. No further exploration activity has occurred in recent years.

Recreational opportunities abound within the Greys River watershed and include camping, hiking, fishing, horseback riding, hunting, picnicking, OHV-riding, snowmobiling, cross-country skiing, wildlife and wildflower watching, and summer drive-throughs. The Box Y Ranch has operated as a guest ranch for hunters for many years; it is the only such guest ranch in the watershed.

Roads were built as people needed access to resources, to cut timber, develop the small mines in the area, and access private land. The Upper Greys River and Smiths Fork Roads were built in 1933 and 1934, making it possible to travel by car from a point at Alpine, up the Greys River to its head, over Commissary Ridge and down the Smiths Fork to U.S. Highway 89. The road was partially re-surveyed and reconstructed in 1955. A few main roads turned into an extensive network over time, especially since the 1960's when timber was heavily cut. Although there is a travel management plan in place, there are more roads in the area than show up on maps. Many of these roads have been inventoried, although with the skyrocketing popularity of All-Terrain Vehicles, new two-tracks are continuously being pioneered.

The Greys River watershed still carries reminders of its past. Some of the old sheep driveways have evolved into recreation trails. The forest holds many remains of log cabins, and the names of early sheepherders are carved into aspen trees. Timber cutting and livestock grazing continue, although at lower levels than in the past.

The economy of the Star Valley area is predominantly agricultural. However, demographics are changing for western Wyoming, and Star Valley is experiencing a boom in residential housing due to population overflow from the Jackson Hole area. Some attempts are being made to capitalize on the large availability of recreation options through a growing tourism market.

Historic Range of Natural Variability

Definition

The term "historic range of natural variability" (HRNV) refers to the composition, structure, and dynamics of ecosystems before the influence of European man. The concept of HRNV is one tool for managing ecosystems for sustainability and biodiversity. It is an attempt to describe the spatial and temporal variation in plant community composition and structure across a landscape and the ecosystem processes that produced that variation. This can give land managers a ballpark idea of the variety of habitats and species an area may be able to support. It is important to understand that long term climate changes need to be considered when HRNV is used.

Climate History

The climate of the Bridger-Teton National Forest is affected by environmental factors that operate at a variety of scales ranging from local to regional, continental, and global. These factors operate at multiple temporal scales as well as differing spatial scales.

Long term climate is affected by many factors, including the theory of the Milankovitch Cycle, which describes the variations in the earth's orbit around the sun and in the earth's rotation. A more detailed description of this cycle is included in Appendix A. Other more short term climatic

factors include seasonal development of the Pacific maritime systems, mass ignitions from large dry lightning storms and occurrence of strong winds.

Hydrologic Cycle (climate and precipitation)

Paleoclimate. The climate in the western U.S. has varied greatly over the last two hundred years. The Little Ice Age (≈ 1750-1850 AD) and the rapid warming period which followed (≈ 1850-1910) are examples of the changeability of a seemingly stable climate. It is important to note the variation that exists, because climatic and human influences are very difficult to differentiate. For example, higher annual rainfall may yield the same disturbance to the rainfall-runoff relationship in a watershed as an extensive new road system. Both cases will result in an increase in runoff, with an additional sediment load increase in the case of the road system.

A brief summation of the past climatic variations can give us insight into the historic range of variation and to how climate helped shape the landscape. The Holocene Epoch is the geologic time period from approximately 10,000 years ago to present. Just prior to the start of this epoch, about 12,000 years ago, a rapid global warming began that has continued till the present with several brief returns to glacial or near glacial conditions. Most of the data shows that during the Holocene the global climate remained relatively stable with minor fluctuations (≈ 1.0-1.5° C) from current temperatures. The altithermal period from about 4,000 to 7,000 years ago is considered the warmest Holocene period and averaged about 1.0-1.5° C warmer than today. Another period called the Medieval Warm Period (MWP) was minor but lasted from approximately 1000 to 1300 AD. The Little Ice Age followed and lasted till about 1850 AD. Then from about 1860 to 1910 there was a rapid warming across the earth. Many of the large fires that occurred throughout the Rocky Mountains occurred during this time period. The importance of a brief global climate history is to show the immense variation over time and to understand that within the next 50 year period many changes could occur that will affect the Greys River and the bordering ranges, Wyoming and Salt River Ranges.

The USGS (2004) has shown that the Wind River Mountains and the Tetons are losing their glaciers at a rapid rate. They expect that unless global warming slows, all the regional glaciers will melt away within the next 40-50 years. There will also be an increase in the rainfall and a decrease in the amount of snowfall which will change the way water and sediment run off throughout the watershed.

Vegetation Patterns

Active settlement of western Wyoming began about 1850. The forest-wide Properly Functioning Condition (PFC) Assessment (Sept. 1997) used the period of 1550 to 1850 to describe the HRNV for the Bridger-Teton National Forest. The PFC assessment compared present ecosystem conditions to those estimated for the pre-settlement period. The effects of long term climate change may not have been fully incorporated into this assessment. The settlement of western Wyoming coincided with a period of rapid climatic warming. It is possible that native plant species are migrating northward in response to warming conditions.

From what we know of historic vegetation patterns we can say the following: Generally there were more openings in the forest cover and the dominant seral stages were early or middle (younger

trees, shrubs, dry upland plants). Tall forb communities were probably characterized by deep, undisturbed soils and high diversity, whereas in many places these sites have become more xeric, dominated by grasses and drought-tolerant forbs. In riparian areas, minor changes in plant composition have occurred through introduction of non-native plants. In some isolated places (for example, Forest Park) human activities have made a difference in the stream. Small side drainages may have had wider streamside riparian areas, especially high upland seeps and springs.

Natural Landscape-Scale Disturbances

Landslides.

Landslides are a common occurrence throughout the assessment area and play a major role in past and present disturbance. The landslides shown in Map 1.1 (following page) were originally classified into 30 or more types by the Wyoming State Geologic Survey and are generalized here into 4 major groups; block slides, slumps, flows and rock slides.

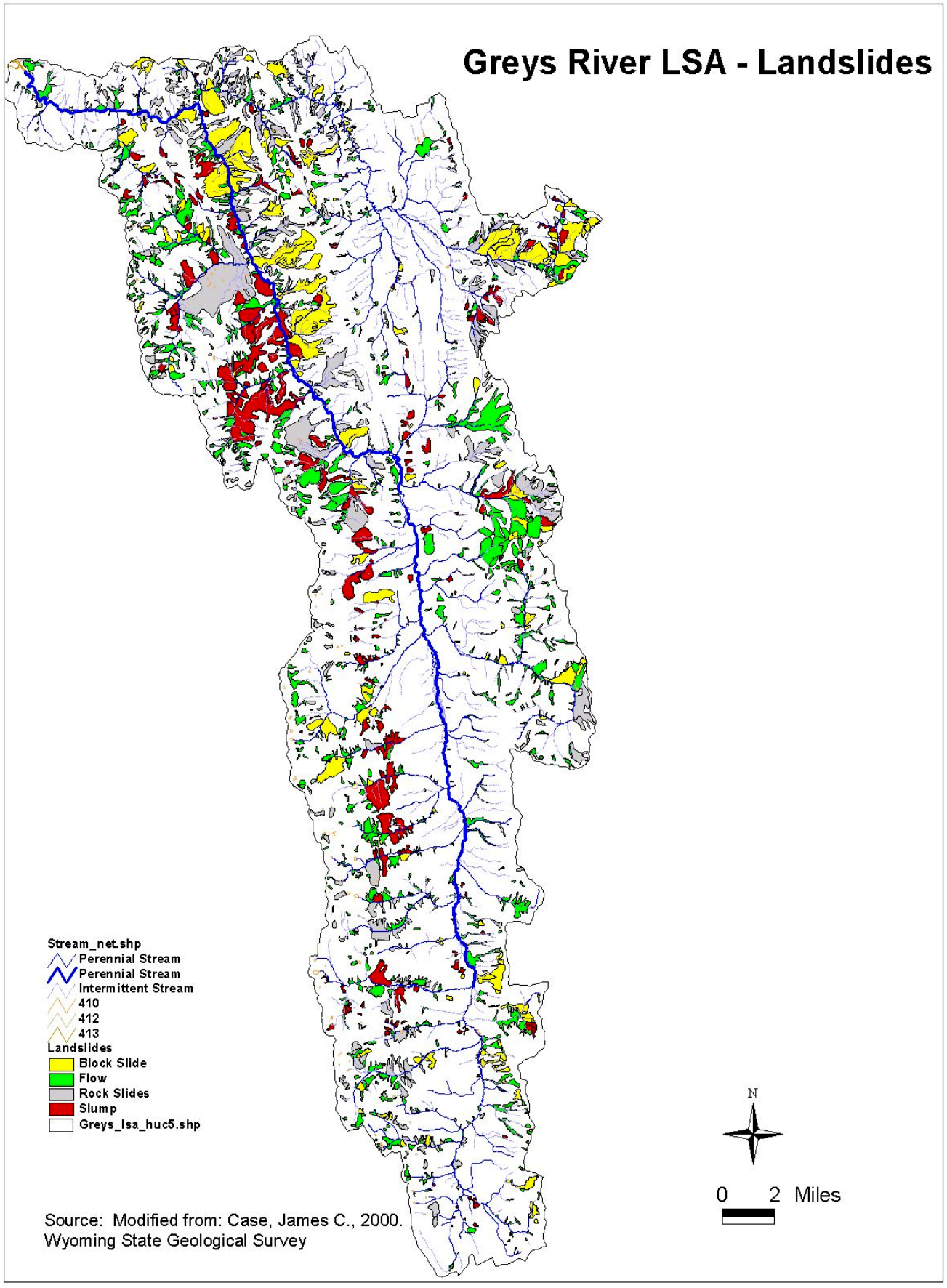
Block slides, or translational slides occur in bedrock and earth where an intact mass slides down the slope. Slumps or rotational slides occur in bedrock, debris or earth where the surface of rupture is concave upward and the mass rotates along the concave shear surface. Flows are characterized by a moving mass that has differential internal movements that are distributed throughout the mass. Most flows occur in debris and earth and can be either cohesive or non-cohesive depending on water content and material properties. Rock slides are a type of non-cohesive flow composed of dry to moist rock fragments initiated by seismic activity or by other processes. Table 1.1 displays the frequency and amount of acres in the assessment area for each landslide group.

Table 1.1 depicts the distribution of the landslide groups across the assessment area.

Table 1.1 Acres of each landslide group

Land Slide Group	Number	Acreage effected
Block Slides	205	14,002
Flow	830	19,520
Rock Slides	343	15,278
Slumps	229	11,732

Map 1.2 Greys River Landslide Activity



Floods

The current climate (last 80 years) shows minor changes in precipitation and temperature. However, the isolations are cyclic and large enough to create floods or wet years and periods of drought. The cyclic pattern appears to follow a decadal pattern with dry and wet years occurring approximately every ten years. For example, high stream flows have occurred in 1997, 96, 84, 83, 74, 71, 64, and so on.

Precipitation and stream flow are the main hydrologic elements used to characterize the hydrologic cycle. Precipitation and stream flows are described by their magnitude, frequency, duration, and timing or graphically by their annual hydrographs.

Within the assessment area, the annual precipitation ranges from approximately 20 inches on the valley floors to 60 inches in the mountains. A majority of the precipitation falls in the higher elevations as snowfall. However, early spring and late summer rain storms can contribute significant amounts of precipitation. The National Resource Conservation Service's (NRCS) Blind Bull Summit Snotel Station is used to show several different years of precipitation, snow-water content, and temperature (Figures 1.1-1.3). Greys River annual streamflow hydrographs for the same years are shown in Figure 1.4. The hydrographs show the annual variation that occurs in the assessment area.

Figure 1.1

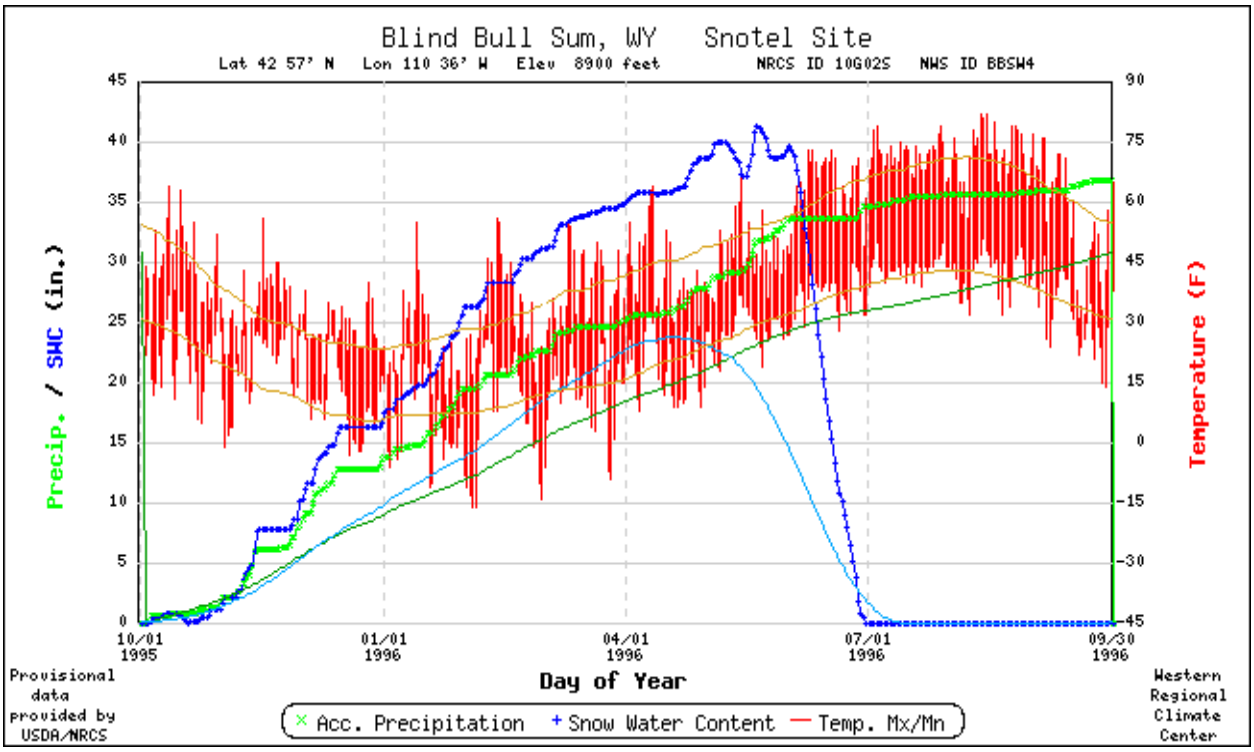


Figure 1.2

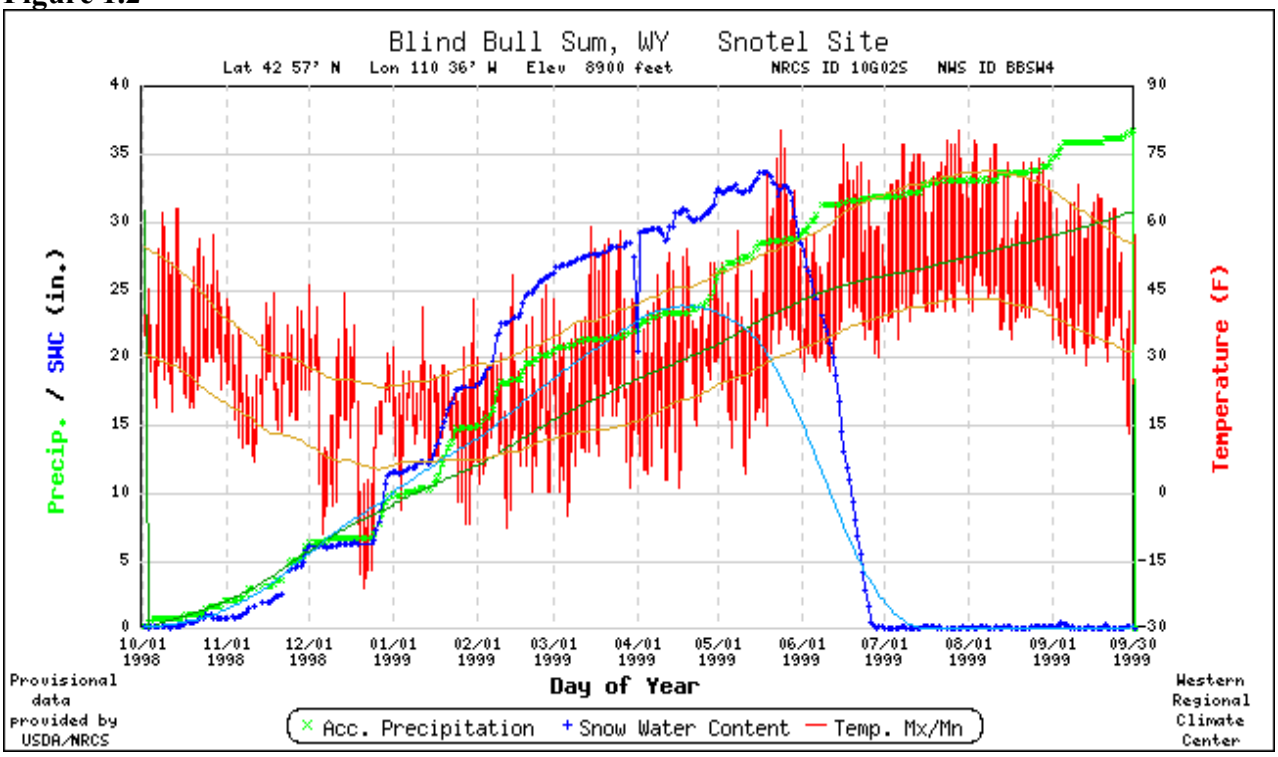


Figure 1.3

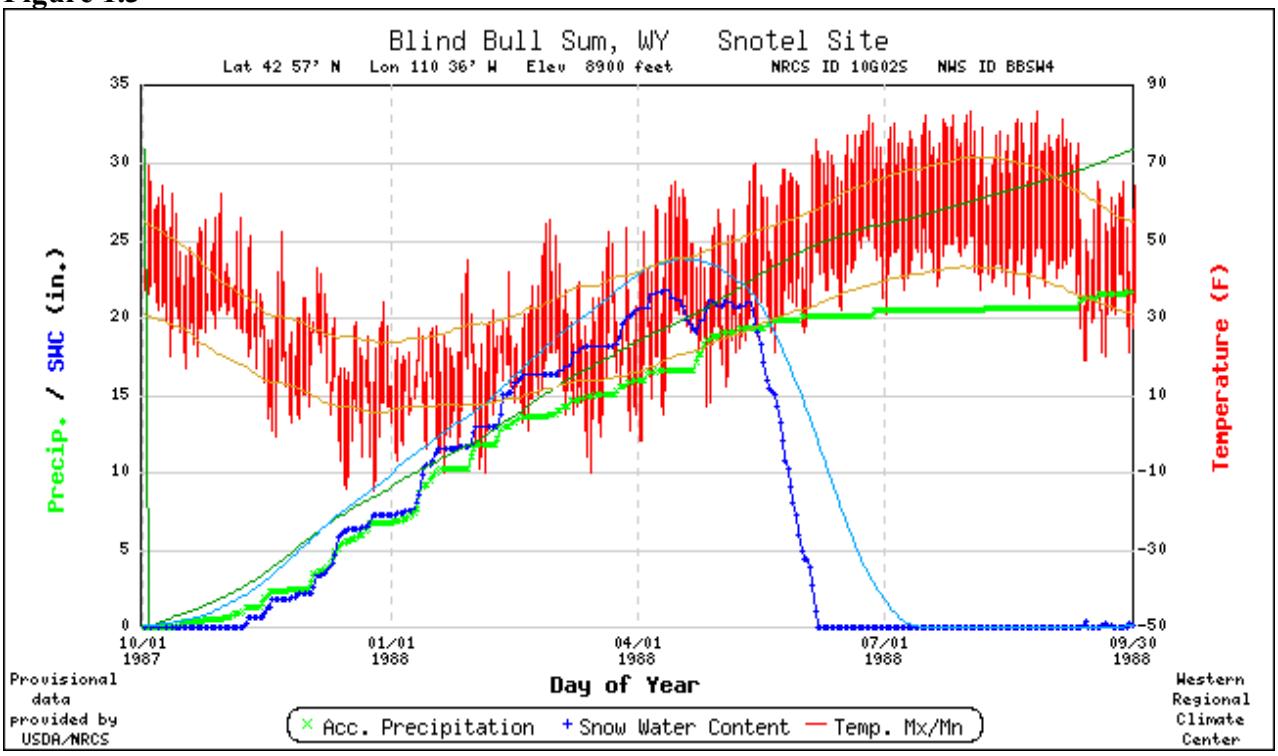
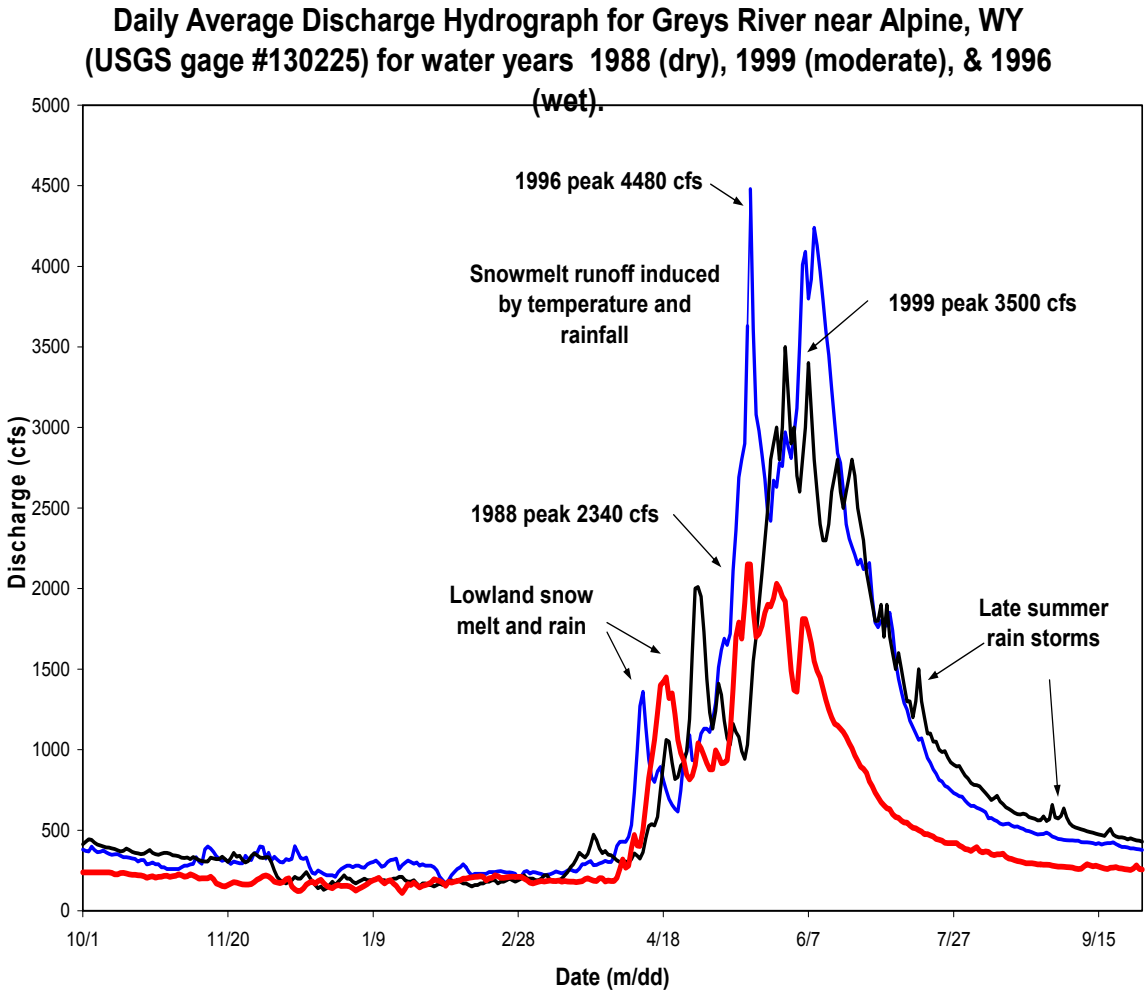


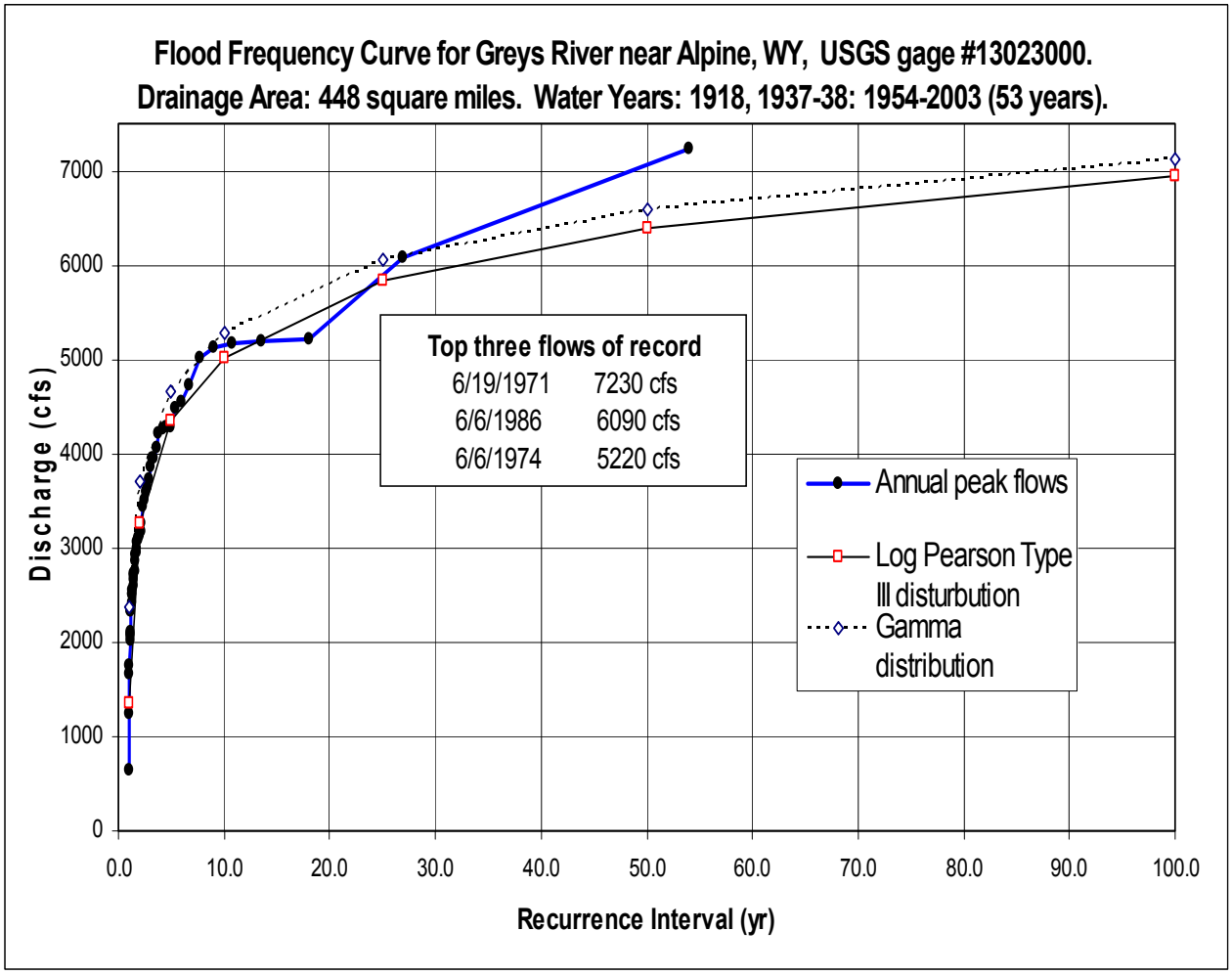
Figure 1.4



Stream Flow Regimes

The Greys River U.S. Geological Survey (USGS) streamflow gauging station (#13023000) has a relatively long record, 1918; 1937-38; 1954-present. An annual flood frequency curve (Figure 1.5) plots the annual peak flows in cubic feet per second vs. the flow's recurrence interval in years. Recurrence interval is the average time period (years) between flow events equaling or exceeding a given stream flow (Dunne & Leopold 1978). The flood frequency curve describes the historic range of annual peak flows and denotes the probability of a discharge occurring within a given timeframe.

Figure 1.5



The three largest flows on record for the Greys River gauge occurred on June 19, 1971, June 6, 1986, and June 6, 1974. It is interesting to note that about every ten years there is a relatively large flow (Figure 1.6). Since we only have 53 years of data, it is necessary to use predictive distributions to try and estimate large recurrence interval flows such as the hundred year event. However, after plotting the two most common distributions on the flood frequency curve we notice that they both underestimate the hundred year flow. Although these curves can be adjusted to better fit the data it cannot be stressed how important long term data is for predicting large flood flows.

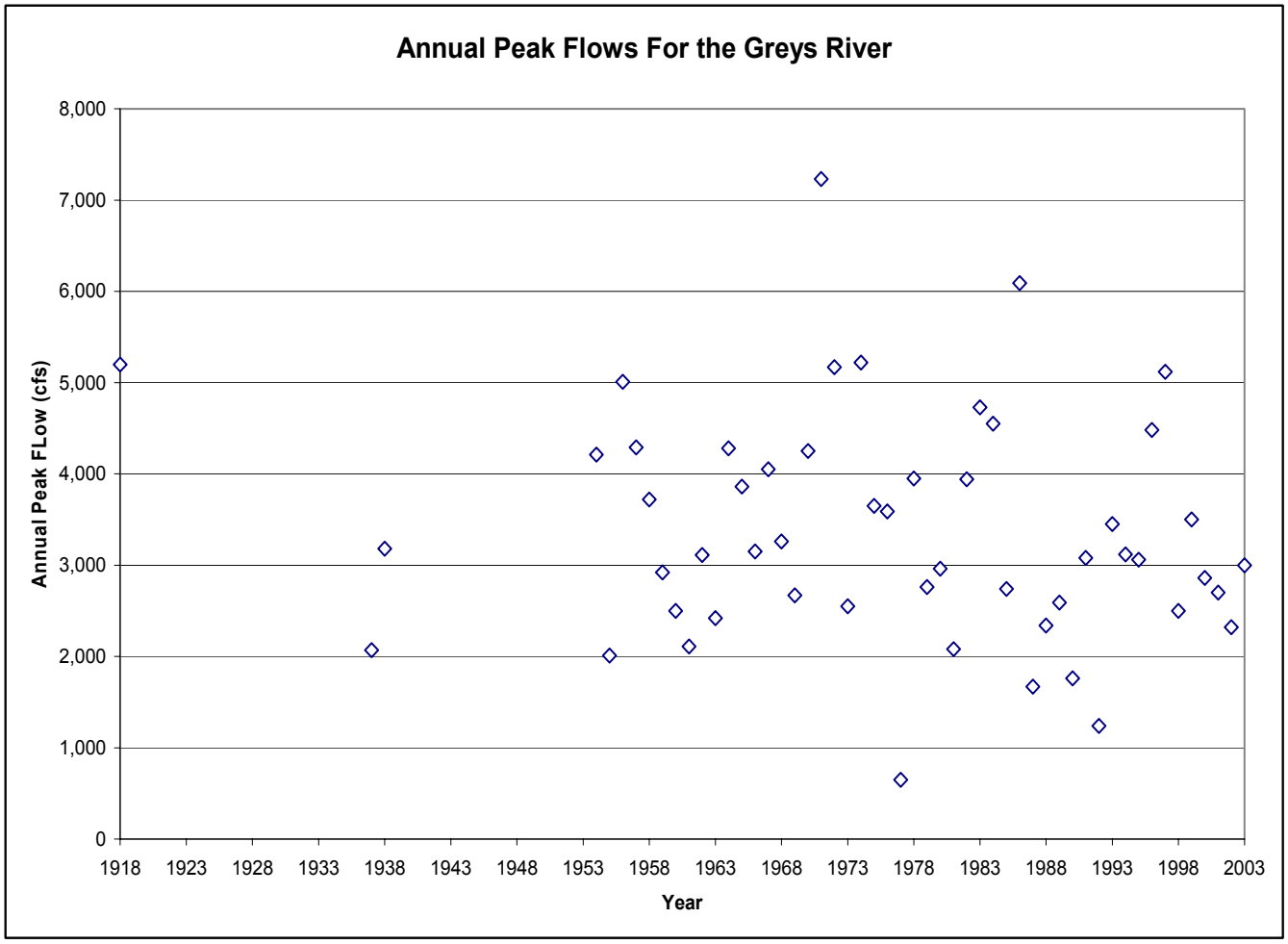


Figure 1.6 Annual Peak Flows for the Greys River

Variations in Flow. Several annual hydrographs for the Greys River gauge are plotted in Figure 1.4. They show the annual flow variation that can occur during a low (1988), moderate (1999), and a high water year (1996). The hydrographs show snowmelt peaks, base flows, and occasional rainfall peaks that are typical for the Greys River. Flows start to rise in late April to early May as the lowland snow melts. The annual flow peak usually occurs between early May and late June and then drops down to a summer base near the end of July. Then in November the streams and rivers begin to ice up and the flow remains low until April.

Natural events (e.g. fire, landslides, etc.) and human land uses (e.g. road systems, grazing, etc.) can affect the different elements of the flow regime (e.g. magnitude, frequency, duration, and timing). For example, if a large area is roaded and harvested or burned there may be an increase in streamflow runoff. Generally it takes about 20-30% of any given watershed to be in a 'clearcut' state before changes to the hydrograph are noticeable.

Local Fire History

Wildfire is an important ecosystem process influencing spatial and temporal variation in plant community composition and structure. The frequency, intensity, and extent of wildfires is closely tied to climatic conditions. The climatic variations of the last 2,000 years appear to have affected vegetation composition and fire regimes throughout North America. However, organized fire suppression has had the greatest short term effect over the last several decades.

The vegetation of the analysis can be classified into "Fire Groups" based on the relationship of each species to fire and forest succession. The fire groups are defined in the publication "Fire Ecology of the Forest Habitat Types of Eastern Idaho and Western Wyoming." Information from the forest plan vegetation inventory, Utah State vegetation data, previous habitat mapping, and personal observation by team members allowed basic classification of fire types in the plan area.

Approximately 46% of the Greys planning area is classified as "mid and low elevation subalpine forests." Lodgepole pine normally occurs in this type as seral species that may or may not burn before the stand moves towards Engelmann spruce/ subalpine fir. The historical fire regime for this fire type is characterized by mixed severity fires every 50 - 80 years with stand replacing fires every 100 to 300 years. The mixed severity fires likely ranged in size from 1/4 to 100 acres or greater and might smolder and creep for much of the summer. Stand replacing fires would occur when a combination of favorable dry and windy fire weather combined with older aged stands that were receptive to a high severity fire.

Small areas of moist and wet subalpine fir occur in seasonally moist or wet conditions, often occurring adjacent to riparian vegetation, moist benches or as stands associated with late-melting snow banks. Fire frequency in this type is possibly as long as 300 to 400 years.

Douglas-fir occupies about three percent of the plan area, much of it in the Greys and Little Greys drainages north of Lake Creek. Douglas fir fire regimes are separated into cool, dry Douglas fir, and moist Douglas fir. In the cool, dry type, stands remain scattered to open and do not develop dense overstory canopies. Fires in this group were normally low to moderate intensity and rarely killed mature Douglas-firs. Fire frequency was approximately 30 to 70 years. Fires in the moist group tended to be more variable in frequency and intensity; fire frequency in this type was likely 50 to 100 years, with stand replacing fires occurring at 200 to 400 year intervals.

Aspen, which currently occupies 6 percent of the plan area, may be the most difficult to define. The communities are extremely variable and fire frequency varies with the understory. It is likely that aspen historically occupied a greater area than currently defined. Aspen communities can either function as a seral or climax species and may coexist with Engelmann spruce, lodgepole pine, subalpine fir or Douglas-fir. Fire frequency was also variable, ranging from 40 to 150 years. In the big picture, aspen was probably more widespread and stands had younger stems.

Sagebrush communities probably had more grasses and forbs in them, which burned frequently, thus keeping sagebrush component at 12 - 20% of total ground cover and reducing encroachment

by conifers. Fire frequencies were likely 15 to 35 years, with shorter frequencies in the drier and warmer sites.

Approximately eleven percent of the plan area is classified as scree, mountain grassland and forested rock. Below and interspersed with this type are pockets of Engelmann spruce, subalpine fir and whitebark pine. The cool and moist sites, high snowpack, and discontinuous fuels all contributed to a short fire season and long fire intervals of 200 years or more. Occasional small fires, mostly single lightning strikes occurred in this zone. The fires rarely attained significant size.

Fire history studies in the Gros Ventre Wilderness and work by George Gruell and others, along with regional studies such as the Columbia River Basin study indicate that this area likely experienced important fire episodes during the mid 1700's and late 1800's, both drought periods. During other years, fires ranging in size from small spot fires to fires of perhaps 500 to 1,000 acres burned with intensities ranging from stand replacing to light underburns.

Short and long term climatic conditions and the timing of large fire occurrence must also be considered. Most notable is the end of the "Little Ice Age" which lasted from approximately 1350 until the mid 1850's. There is some debate about the effect of long term climate change on fire regimes. Several researchers believe that during cool periods the fire interval increased, but when the fires did occur, they were more intense and widespread. As we came out of the Little Ice Age in the late 1800's, the long term warming combined with a short term spike of warm weather that further increased favorable burning conditions.

The number of aspen stands established during each fire episode also suggests that 1869, 1889, 1910, 1919 were extensive fire episodes. Eighty percent of the aspen stands sampled in 1978 were established between 1867 and 1921. This suggests that most of the aspen stands on the Forest are presently between 80 and 130 years old.

Map 1.3 on the following page demonstrates the recent fire history of the analysis area.

Map 1.3 Fire History

CHAPTER 2
EXISTING CONDITIONS

Introduction

In this section, current conditions and trends in physical processes, natural resources and human activities in the assessment area are described. This information will be used to explore differences that may exist between past and present conditions, allowing the team to formulate relevant issues and concerns identified later in the document. Existing conditions provide a benchmark for future projects.

Reference or historic conditions are described by resource area. The beginning of Euro-American influence in the mid to late 1800's has been chosen as a baseline for this assessment. While not intended to be comprehensive, this overview of reference conditions includes the information necessary to compare with current data, putting existing conditions into context.

Reference conditions show how ecological conditions have evolved over time as a result of the interplay of various natural processes and human influences. This historic perspective gives insight into the resiliency of the watershed, which is to say how natural and human 'disturbances' are absorbed and how the system rebounds. By clearly understanding the capabilities of the local environment, predictable events and effects of various activities can be extrapolated. Management recommendations can then be formulated that work with, rather than against, natural processes to produce desired outcomes.

Where appropriate, this chapter also describes the analysis process. These methodologies are taken into consideration during the development of Desired Condition statements, and in conjunction with reference conditions. In some instances, descriptions of further information needs which would aid in management decisions are given.

Heritage Resources

Heritage resources include prehistoric sites, historic sites, traditional use areas (referred to as traditional cultural properties), and cultural landscapes. Collectively they are referred to as Historic Properties.

Heritage Resources are non-renewable resources. Federal regulations have been passed to protect and manage significant resources on federal lands or when federal permits, licenses, or funding is involved. The Antiquities Act of 1906, the Historic Sites Act of 1935, the National Historic Preservation Act (NHPA) of 1974, the Archeological Resource Protection Act (ARPA) of 1979, and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 exemplify the long and progressive history of regulations concerning the protection and management of significant heritage resources.

The National Historic Preservation Act, implemented by 36 CFR 800, outlines an evaluation process to determine the significance of heritage resources. The Forest Heritage Resource Manager, in consultation with the State Historic Preservation Officer (SHPO), evaluates heritage sites to determine if they are significant and qualify for listing on the National Register. Sites are determined to be either Eligible or Not Eligible for listing in the National Register of Historic Places (NRHP). Eligible sites can be formally registered or listed on the National Register. Sites which have not gone through the formal evaluation process are determined to be Unevaluated and are viewed as potentially Eligible and warrant appropriate protection, along with Eligible sites.

Federal regulations also require the Forest Service to assess if eligible or potentially eligible heritage sites will be impacted by proposed undertakings on federal lands. In addition, goals and objectives outlined in the Forest Service National Strategy Plan for Heritage Resources and the Bridger-Teton Forest Management Plan call for the study and interpretation of heritage resources for the public and to find and protect heritage resources so that their scientific, historic, and social values are retained.

Within the assessment area, approximately 5495 acres, or 52% of the total area, have been intensely inventoried in search of heritage resources. Most of these inventories were conducted in response to specific projects proposed on the Forest, such as timber sales, oil and gas exploration, prescribed burns, or road improvements. As a result of these inventories, a total of 34 sites have been identified and recorded. These include 22 prehistoric sites, 11 historic sites, and one site with both a prehistoric and historic component.

Existing Prehistoric Sites in the Assessment Area

The archeological record indicates that prehistoric people have inhabited northwest Wyoming for the past 10,000 years. Much of this evidence comes from investigations outside the assessment area in places like the Green River Basin and Jackson Hole. The earliest prehistoric artifacts recorded in the assessment area date to around 3,000 years ago. It is quite likely that prehistoric people occupied the assessment area before that time but no datable evidence has been found to verify that.

Of the 22 recorded prehistoric sites in the assessment area, 15 have been formally evaluated as being Not Eligible for the National Register and 7 are Unevaluated. There are no prehistoric sites in the assessment area that have been determined Eligible for the National Register. The sites that have been recorded tend to be small lithic scatters indicative of temporary campsites or work stations. These populations were largely nomadic and operated on a hunter-gatherer subsistence level. They were intimately familiar with the environment and availability of the flora and fauna resources of the area. This allowed for a scheduling of seasonal migration patterns to take advantage of the many environmental zones from the low elevation river bottoms to the high alpine meadows and mountain peaks. This level of hunter-gatherer subsistence strategy was so successful that it remained basically unchanged for the last 10,000 years. It wasn't until the introduction of the horse in the late 1600's that major changes occurred in this seasonal subsistence pattern.

The artifacts found on these sites provide clues concerning the types of resources being exploited, the relative ages of the sites, and potential travel and migration patterns. Obsidian is commonly found on the sites indicating that these populations traveled to the major obsidian source areas, such as Jackson Hole, Obsidian Cliffs in Yellowstone National Park, or the Malad area in present day southeast Idaho.

Certain prehistoric site attributes were compiled and tabulated to help identify where prehistoric sites may be located and help identify prehistoric land use patterns. In general, prehistoric sites are located within 100 meters of permanent water sources, on fairly level terrain, and in close proximity to major changes in vegetation communities. It should be noted that a majority of the previous inventories in the assessment area for timber sales, oil and gas exploration, and prescribed burns fall outside these expected prehistoric site perimeters.

Most of the prehistoric sites located in the assessment area are in relatively good condition with little evidence of past disturbance. However some sites have been heavily impacted by erosion caused by years of intensive sheep grazing, or by dispersed recreational activity. Unauthorized artifact collecting by the general public has also likely removed valuable artifacts from some of these sites.

Prehistoric site locations are not disclosed in this document. In order to protect and preserve those irreplaceable heritage resources, detailed site descriptions and locations are exempt from disclosure under the Freedom of Information Act in accordance with the Archeological Resource Protection Act of 1979 (16 USC 170hh) and the National Historic Preservation Act of 1966 (16 USC 470w-3).

Native American Cultures and Present Use

Archeological and ethnographic sources indicate that Native American cultures have occupied northwest Wyoming for thousands of years. While archeological and historic preservation laws address archeological concerns, until recent years the laws did not adequately protect or address other cultural values or traditions being practiced in modern times. The American Indian Religious Freedom Act of 1978, the Native American Graves Protection and Repatriation Act of 1990, and Executive Order 13084 of May 14, 1998 define and strengthen the rights of Native Americans and clarify responsibilities of federal agencies regarding these additional cultural values. The Fort Bridger Treaty of 1868 granted traditional hunting, fishing and gathering rights to Native Americans outside reservation boundaries and that treaty is still recognized and applies to lands within the assessment area. The forest continues to work with individual tribal governments to further identify and address Native American concerns and traditional uses of National Forest System Lands.

Existing Historic Heritage Sites in the Assessment Area

Of the 34 recorded sites in the assessment area, 11 are historic and one has both a prehistoric and historic component. Five of the historic sites have been determined to be Eligible for the National Register, five have been determined to be not eligible, and one is unevaluated. The site with the historic and prehistoric component has been determined to be Not Eligible for the National Register. There are no historic properties in the assessment area that are listed on the National

Register of Historic Places. The following table lists the eligibility status of known historic sites recorded in the assessment area.

Table 2.1 Eligibility Status of Recorded Historic Sites in the Assessment Area

Eligible Sites	Not Eligible Sites	Unevaluated Sites
Deadman Fire Lookout	Wyoming Peak Lookout	Elk Mtn Lookout
Cazier Guard Station	McCain Guard Station	
Cabin Creek Lookout	Vail Coal Mine	
Meadows Guard Station	Pickle Pass Salt Cabin	
Deer Creek Guard Station	BT-436 (Aspen Carvings)	
	BT-61 (Destroyed Cabin)	

As noted in the above table, a majority of the recorded historic sites in the assessment area are Forest Service Administrative structures such as fire lookouts and guard stations. Two historic sites, the Pickle Pass Salt Cabin and BT-436 are related to historic sheep grazing activities. The Vail Coal Mine is obviously related to coal mining activities. Historic cabin BT-61 was destroyed by the Corral Creek Fire in 1988 and may have been an early Forest Service Guard Station. It is likely that additional historic structures are present in the assessment area, such as trapper cabins and salt caches.

The historic sites within the assessment area are generally in fair condition. Routine maintenance is generally conducted on the historic guard station; however the fire lookouts have been abandoned and are falling into disrepair. The Wyoming Peak Fire lookout is almost completely collapsed due to years of exposure to the elements on top of Wyoming Peak. Structures associated with coal mine or sheep herding activities are falling into disrepair because of neglect and natural decay.

Reference Conditions in Heritage Resources

Archeological research conducted in the Greater Yellowstone Ecosystem over the last 30 years has uncovered evidence of human populations utilizing the mountainous areas of western Wyoming for much of the last 10,000 years. These populations were largely nomadic and operated on a hunter-gatherer subsistence level. They were intimately familiar with the environment and availability of the flora and fauna resources of the area. This allowed for a scheduling of seasonal migration patterns to take advantage of the many different environmental zones. This level of hunter-gatherer subsistence strategies was so successful that it remained basically unchanged for the last 10,000 years. It wasn't until the introduction of the horse in the 1600's that major changes occurred in this seasonal subsistence pattern.

By the time the Euro-Americans arrived in western Wyoming, the Native Americans had become well-adapted to a lifestyle centered on the horse. Seasonal migration patterns were greatly expanded, allowing these populations to cover more territory. The Shoshone-Bannock tribes of eastern Idaho made frequent trips into Wyoming to hunt buffalo, which had become extinct in Idaho by 1840. The Greys River drainage would have been part of the area utilized by the Shoshone-Bannock. The Wind River Shoshone also frequented the Greys River area and included it as part of their seasonal migration pattern.

A report written by C.H. Miller in 1858, commenting on the passing of emigrants through Indian territory, noted the following: "The animals of the emigrants will destroy the grass in the valleys where the Indians have kept the pine timber and willows burnt out for years as halting places in going and coming from their great annual buffalo hunts." It is not known if the Native Americans practiced this form of "prescribed burning" in the Greys River country or not. During the settlement of Star Valley in the 1880's, it was noted that Indians were still following their migratory way of life with hunting trips between Fort Hall and the Wind River Reservation (Kennington and Hamblin 1989), and these migrations may well have included the Greys River.

Evidence of these prehistoric populations has been found in a few locations along the Greys River. These prehistoric sites tend to be small, temporary camp sites with only a few broken stone tools or flakes remaining. The high level of dispersed recreation activity along the Greys River today appears to have had a heavy impact on many of these prehistoric camp sites.

The historic period begins with the arrival of the mountain men and trappers of the early 1800's. John Colter is credited with being the first of the early trappers in western Wyoming in 1807. Although he did not explore the Greys River drainage, he was followed in 1810 and 1811 by John Hoback, Edward Robinson and Jacob Reznor, all employees of the fur trapper and entrepreneur Andrew Henry. Their familiarity with the area came into play in 1811 when they guided Wilson Price Hunt and the Astorians through the Jackson Hole country on their trip to the mouth of the Columbia River. As this party reached the confluence of the Snake River and the Hoback River, Hunt sent a smaller party west down the Snake River. This party, consisting of John Reed, John Day, and Pierre Dorion, camped at the confluence of the Greys River and the Snake River. Finding the Snake to be un-navigable, they returned to the main party at the Hoback and continued north into Jackson Hole, then west over Teton Pass. The Greys River was called the John Day's River on at least one map in honor of a trapper in the Astorian party. Other research asserts that John Gray was the inspiration for naming both Grays Lake (west over the Caribou Range) and Greys River. He was an Iroquois trapper and leader, also known as Ignace Hatchiorauquasha, and influential in the changing fortunes of the Hudson's Bay and American Fur Trapping Companies. He plied his hazardous trade for over 20 years with his wife and children beside him.

Osborne Russell was another noted trapper who explored the Greys River drainage. In June of 1838 he left Fort Hall and, on his way to the trappers' rendezvous on the Wind River, crossed into the Greys River drainage where he trapped beaver on the small streams which ran into the main river. He then traveled up the length of the Greys before dropping down into the LaBarge Creek drainage. In January of 1839 Russell returned to the canyon of the Snake River with some fellow trappers and 7 lodges of Snake Indians. He would spend much of that winter in the canyon of the Snake hunting mountain sheep, elk and buffalo (Haines 1986).

The period from 1842 to 1856 appears to have seen little Euro-American influence in the Greys River area. Although it is possible that an occasional trapper or hunter visited the area, the entire drainage appears to have been the domain of the natural environment and seasonal Native American presence.

The pressures of a growing and expanding country lead to the next phase of Euro-American

involvement in the west, namely the great migrations of the mid 1800's. Large numbers of emigrants were heading west over the Oregon Trail, and with the expanding influence of the federal government, the desires for more wagon roads and a possible railroad to the west coast were increasing. Fredrick W. Lander was sent west in 1857 to find such a travel corridor. Ultimately the Lander Cut-off of the Oregon Trail was constructed south of the Greys River drainage; however Lander explored possible routes over McDougal Gap and into the Greys River via the Sheep Creek drainage. In addition he also surveyed the lower reaches of the Greys River for possible travel corridors.

The construction of the Lander Cut-off not only brought emigrants west, but was used extensively as a sheep and cattle driveway during the late 1800's. Thousands of head of cattle, sheep and horses were driven from the Washington/Oregon Territories to Wyoming and Nebraska (Kennington and Hamblin 1989). As early as 1880, the Latter Day Saints began to herd thousands of cattle and sheep from the Salt Lake area north to summer pastures in the Star Valley area and surrounding mountains (USDA 1942). In 1897, pioneering sheepman A.A. Covey reported grazing his herd in upper Cottonwood and Swift Creeks, on ranges that looked like no sheep had ever grazed there before. The following year he moved to the east slope of the Salt River Range and the Wyoming Range, where he found conditions uncrowded and feed plentiful. Then, he states, "In 1900, the whole situation changed when Tom Kinney brought 100,000 head of ewes into the Cokeville country." By 1901-02, competition between local and regional sheepmen, and between sheep and cattle interests, flared. Gone were the ungrazed basins, and gunfights were said to be common. The range belonged to whoever got there first in the spring.

The sheep would be trailed the entire length of the Wyoming Mountain Range during the spring, then trailed south along the same driveway during the fall. Sheep were trailed along ridgetop driveways, where they continued to cause erosion problems. The sheep driveways were closed in 1969, and many areas have begun recovering. As much as five feet of soil was eroded from vulnerable areas like Sheep Pass; such areas are permanently altered.

A report on conditions of domestic sheep driveways, dated January 1970, makes the following statement:

"The use of the sheep driveways on the Wyoming Division (Wyoming Mountain Range) started in the late 1800's when the sheep industry expanded. Intense competition for rangeland developed. On a first-come, first-served basis, the earliest and fastest bands grazed the choice feeding areas. No regulations controlled the number of sheep, areas grazed, or the duration of grazing on the mountain range. It is said much of the driveway was used four times a year by each band. The sheep were driven to the high country early in the spring, following snow melt up the mountain. The bands were driven down in the latter part of summer to the nearest railhead, such as Cokeville, to ship out the lambs. The sheep were then driven back up to the high country, remaining there until the fall snows forced them toward the valley."

Old timers in Star Valley recall being able to count the bands of sheep on the driveways by the clouds of dust on the skyline. No one knows the exact number of sheep trailed around the turn of the century but estimates are on the order of a half million sheep. By 1915, there were 175 permittees grazing 216,500 sheep, and 10,000 cattle and horses on the Wyoming National Forest, while by 1963 the number of permitted sheep had been reduced to 115,000 animals.

The condition of the driveways is graphically described in a Bridger-Teton National Forest Multiple Use Analysis dating from 1963:

"The Wyoming Division Sheep Driveways could best be described as a running abscess, extending 221 miles in length and damaging 44,030 acres of National Forest System lands. This abscess is spewing silt, mud, gravel, boulders, and timber into every major stream on the Wyoming Division of the Bridger National Forest. It is gradually growing larger and its impact on other resources is increasing."

With the establishment of the national forest in 1905, grazing came under an allotment system, and livestock numbers were regulated. But in only a few years, the damage had been done. Long parallel terraces cut into mountainsides in the southern Greys River watershed still can be seen from the Smiths Fork and upper Greys River. The terraces were built to trap sediment and allow plants to recolonize denuded areas. The driveways were finally closed in 1970 and trucking of sheep was required on most of the allotments. Recovery has been varied across the areas affected by the driveways. On the more gentle slopes with better soil fertility, vegetative improvement has been fairly rapid as evaluated in a field review of the driveways in 1979. On the steeper slopes and gullied areas, revegetation has been retarded. In a few of the most severely eroded sites, pioneer vegetation is just beginning.

Watershed restoration efforts over the past twenty years have concentrated on gully-plugging and reseeding of badly depleted ranges. Although precise inventory survey is lacking, the areas in need of restoration are likely to be in the neighborhood of 5 to 10 thousand acres total by comparison to the 44,000 acres cited in the 1963 report. This practice of trailing sheep the entire length of the Wyoming Mountain Range was discontinued in the 1960's by the Forest Service. The massive sheep drives of the previous 80 years were having a devastating effect on the range.

The early 1900's saw an increase in homesteading activity in the Greys River drainage. The first homestead entry was listed in 1912 by James Moffat for approximately 160 acres at the confluence of the Greys River and Deadman Creek. This was followed by homestead entries by Willie Ribbons in 1913, and during the late 1920's by John Brown and Nora and Rolla Low just north of Meadow Creek. Early Homestead Entry maps for this area show the presence of ditches used for irrigation of summer pastures along the Greys River. These early homestead entries remain the only private in holdings in the Greys River drainage.

The U.S. Forest Service officially became involved with the management of the Greys River area in 1908 with the creation of the Wyoming National Forest. In 1912 a one room patrol cabin was constructed near the present day Meadows Guard Station. Another patrol cabin was located at Squaw Flat. In addition to administering cattle and sheep grazing and patrolling for forest fires and poachers, early Forest Service rangers were responsible for improving roads and trails along the Greys River, and for constructing a phone line linking the guard stations with Alpine. During the 1930's the Civilian Conservation Corps (CCC) became actively involved along the Greys River. CCC camp F-11 was constructed at the junction of Sheep Creek and the Greys River, and early CCC improvements included the construction of new guard stations, road construction and betterment, telephone line construction, and other improvements. During the period between 1929 and 1933 a very intensive insect control project was conducted in the lodgepole pine stands on the Greys River for the purpose of controlling an epidemic of the Mountain Pine beetle. Control work

was done in the spring and fall by burning crews who would spray the infested trees with fuel oil and then set them on fire. The heat generated by the burning oil was sufficient to kill the beetles and larvae residing in the trees. The fuel oil was transported into the upper sections of the Greys River where only a horse trail existed. A two wheeled cart was improvised that would hold two barrels of oil. It was necessary for the teamsters hauling the oil to work their way up the river with several fords or crossings required. The return of the empty oil barrels back down the river required a dozen or so barrels to be tied together in a raft. This was then turned down the river with two men to try and steer the raft with poles.

The late 1930's saw the development of coal mining in the Greys River drainage. The first of these mines was the Blind Bull Mine which started operation in 1933. Between the years 1933 and 1956 a total of 317,723 tons of coal were trucked out of the mine (Gardner N.D.). The Vail Mine, located just north of Blind Bull on Deadman Creek, was originally permitted in 1935. In that year, operating with a thirty man crew, a total of 3,232 tons of coal were produced (Smith 1986). The following year some $10,000 worth of improvements were made to the mine which allowed for 9,250 tons of production in 1937. In February 1938 a disastrous mine explosion occurred at the Vail Mine killing five miners. The Deadman mine continued in operation on a limited basis from 1957 to 1963 during which time approximately 3,108 tons of coal were removed.

The Kleinstick Mine, located just east of McDougal Gap, started in 1938 and continued production until 1963. The road over McDougal Gap was constructed by Shorty Kleinstick so that people in Greys River and Alpine could get coal. By the late 1930's the road system in the Greys River drainage and its tributaries appears to have been well established.

Large scale timber operations in the Grey River drainage did not start until the late 1940's. Tree cutting began with the early settlers, and for several decades supported small, local mills. Greys River lumber supplied logs and lumber for the growing towns in Star Valley. A sawmill was constructed at the head of the Greys River near Tri-Basin Divide in 1947. It supplied lumber for regional projects including the construction of Palisades Dam. For a few years an active year-round logging camp existed there. The mill burned in 1962 and was not re-constructed. The Greys River Lumber Company built a sawmill in Squaw Creek in 1951. It was later moved to Alpine. By the mid-1960's, the area's major mill was located in Afton and most of the smaller mills had closed. During the 1960's and 1970's, approximately 20MMBF/year were logged in the watershed, mainly on the forested bench lands above the river.

Physiography

The LSA includes a wide array of landscapes and geomorphic settings ranging from sagebrush valleys and foot slopes to the high elevation alpine peaks. The two dominant mountain ranges are the Wyoming Range and the Salt River Range. These ranges demonstrate unique folding and thrust-faulting which result in a complex and repeating pattern of structural geology. Dissection of these mountains by stream cutting, glaciation, and mass wasting has modified the topography to their present form.

Structurally, the mountains occur as arcuate north-south trending ranges separated by narrow,

alluvium-filled valleys. The ranges occur as large sheets of Paleozoic and Mesozoic sedimentary rocks which have been pushed, or thrust, eastward in a series of progressively younger thrust faults. Each thrust dips shallowly to the west, often placing older Paleozoic rocks in direct contact with younger Mesozoic rocks. This type of mountain building is referred to as overthrust folding and faulting.

Overthrust faulting in the area occurred during a time of mountain building know as the Sevier orogeny, from about 150 to 55 million years ago. During that time, a tremendous amount of thrust faulting occurred in North America, extending from Alaska to Mexico. This type of faulting resulted from compressional forces encountered when the earths crust is squeezed laterally due to tectonic movement.

There are five major thrusts associated with the assessment area. Two of these, the Paris-Willard thrust and the Crawford-Meade thrust occur to the west of the area. The remaining thrust faults developed from Late Cretaceous to Tertiary time. The Absaroka thrust is the oldest and most western thrust fault. Displacement along the Absaroka thrust occurred during the Late Cretaceous time. The Darby thrust is located east of the Absaroka thrust developed during the Paleocene time. The youngest and easternmost thrust is the Prospect-Jackson thrust which developed during the Early Eocene time.

The drainage pattern is typically trellis with major stream confluences occurring at right angles to the Greys River. Stream dissection is generally high, as evidenced by narrow floodplains and oversteepened valley walls. In many areas, active downcutting accentuates slope stability problems resulting in increased mass movements. Mudflows, earthflows and some slumps occur predominantly on slopes of finer textured Mesozic rocks in dip slope positions. Along the steep valley walls, debris flows of rock and mud extend onto the valley floor. In the winter, these steep valley walls are where abundant avalanches uproot large trees and earth to form avalanche chutes.

There are two major mountain ranges that comprise this LSA: the Salt River Range and the Wyoming Range. The geology is dominated by Paleozoic and Mesozoic sedimentary rock formations including Thaynes Limestone, Ankareh Redbeds, Nugget Sandstone, Twin Creek Limestone, Preuss Redbeds, Amsden Formation, Wells Formation, Madison Limestone, Big Horn Dolomite, Gallatin Limestone, and the Gros Ventre Formation. All have been modified by thrust faulting, glaciation, and mass wasting. Elevation ranges from 5,900 to 11,390 feet and slopes range from 10 to 100 percent. The dominant types of rocks are limestone, dolomite, mudstone, sandstone, and shale. The primary geomorphic processes in these landscapes are fluvial, colluvial and mass wasting.

Mean annual precipitation ranges from 20 inches in the Star Valley to 60 inches in the upper elevations of the Wyoming Range. Much precipitation occurs in the winter with 30 percent of the precipitation falling as snow. The mean annual air temperature is 32 degrees F to 40 degrees F.

Streams and rivers typically occur in strike valleys. The landscape is highly dissected. Wetlands occur along streams and the Greys River with alluvial and glacial deposits. Lakes occur in the upper mountains where glaciers have scoured depressions and where glacial or landslide deposits

have trapped seasonal runoff.

A soil survey was conducted in the area from 1987 – 1993 which provided information on soil types, associated vegetation, landforms, geology and geomorphology. The following paragraphs summarize the soil survey information. More detailed descriptions and maps are available at the Forest Supervisors office.

The LSA consists of 3 primary landscape settings. These include the mountain ranges, benches, and stream-cut valleys. The mountain ranges are located on high elevation sites with dominant slope gradients from 40 to 100 percent. This landscape includes mountain peaks, cirque headwalls, cirque basins, scarp slopes, and ridges that are formed in limestone, sandstone, shale, and mudstone. The primary soils are 20 to 40 inches thick and have gravelly and very gravelly clay loam and sandy clay loam textures. The dominant potential natural vegetation is subalpine fir/Oregon grape, subalpine fir/common snowberry, subalpine fir/grouse whortleberry, Engelmann spruce/grouse whortleberry, and tall forbs.

The benches are located on mid elevation sites with dominant slope gradients from 0 to 40 percent. This landscape includes upland benches, old pediment surfaces, landslides, and mountain sideslopes formed in sandstone, shale, siltstone, mudstone, and fanglomerate. The primary soils are generally 60 inches thick and have silt loam and silty clay loam surface textures with gravelly and very gravelly silty clay loam subsoils. The dominant potential natural vegetation is subalpine fir/pinegrass, Douglas fir/blue huckleberry, subalpine fir/grouse whortleberry, and Engelmann spruce/grouse whortleberry.

The valleys are located on low elevation sites with dominant slope gradients from 0 to 20 percent. This landscape includes alluvial fans, terraces, floodplains, stream bottoms, and toes of landslides and debris flows that are formed in various materials. The primary soils are 60 inches thick and have various textures. The dominant potential natural vegetation consists of riparian communities along streams and rivers. Drier potential natural vegetation types occur on terraces which include mountain big sagebrush/Idaho fescue, subalpine big sagebrush/mountain brome, and subalpine fir/heartleaf arnica.

Slope stability was assessed during the course of the Soil Survey conducted in the area from 1988 – 1993. Stability ratings are defined as follows:

Stable: Evidence of past landslide activity has not been discerned and the observable characteristics of the land are evidence that the probability of landslides in the future is low.

Marginally Stable: Evidence of past landslide activity has not been discerned but there are some land characteristics that suggest a landslide potential may exist.

Marginally Unstable: Evidence of past landslide activity is discernable but none of are recent origin, i.e., within the last 50 years. The assumption is that the area is gaining stability but certain disturbances at critical locations could reactivate mass movements.

Unstable: Evidence of recent mass movement or fresh tension cracks are discernable. Probabilities of additional mass movements are high.

Slope stability ratings are displayed in Map 2.1. Forty-three percent of the area is rated marginally unstable, 28 percent stable, 15 percent marginally stable and 14 percent unstable.

MAP 2.1

Watershed Function and Aquatic Habitats

Fluvial Processes and Channel Morphology

Introduction

Fluvial processes are defined as any in-channel water derived physical process. Channel morphology describes the channel's shape, which is determined by the imposed flow regime, sediment load, in channel structural elements (e.g. large woody debris, bedrock outcrops), and valley gradient. Stream channels provide an array of gravel bars, pools and riffles, which provide a complex and diverse habitat for riparian vegetation and aquatic life.

Hydrologic events, such as droughts and floods, constantly adjust streams and rivers by changing the sediment and water supplied to the streams. However, streams generally manage to maintain a quasi-dynamic equilibrium state. These fluctuations or variations describe how a stream channel reacts to different changes imposed by the watershed. To investigate how various natural processes and human land uses affect stream channels several fluvial concepts should be discussed first.

Floodplains and terraces

Stream channels develop their floodplains by migrating back and forth across their valley bottoms. As the outside bank erodes in a meander bend the inside bank grows. And if similar climate conditions prevail for long periods of time then a stream channel can migrate back and forth across the whole valley creating a new floodplain surface. However, the climate generally fluctuates its overall temperature and precipitation so the base channel level will change. During the glacial and inter glacial periods large changes in the amount of precipitation led to changes in the stream bed elevation. Therefore, floodplains may be abandoned or destroyed depending on if the bed is aggrading or degrading. An abandoned floodplain is called a terrace.

The LSA area lower elevation streams typically have three prominent terraces and a floodplain. However, there are numerous places where you can find five or more terraces. Each terrace generally corresponds to a change in the climate (i.e. regional temperature and precipitation) that results in a change to the stream flow and/or sediment regimes. In glaciated regions it is assumed that larger rivers built the higher terraces because of the stream flow required to transport the large amount of material. When the glaciers begin to melt and retreat the additional flow reworks the glaciofluvial sediments and entrenches the existing floodplain creating a terrace (Leopold et al 1957). This sequence was repeated several times in the LSA area with sequentially smaller glacial events leading to a series of terraces.

As larger glacial retreat the lakes can form behind the morainal dams. If these lakes burst or have rapid run outs then outwash plains of sediment can be created. Also during these retreats the hillslopes held up by the glacial will slide in large quantities feeding the melt waters with large quantities of sediment that deposit at a stream basins mouth creating large alluvial fans.

Channel migration and avulsions

Stream channels meander back and forth across their valley floor interrupted occasionally by terrace remnants, bedrock outcrops, and/or man made items (e.g. rip-rap). The meanders found in

the Greys River valley are typical of large gravel rivers. Individual meanders typically move downstream and across valley. Occasionally large meanders will "cut off" during a large or prolonged flood year.

Importance to future planning and projects

Being able to identify future channel migration and what horizontal surface adjacent to a stream will flood is extremely important to the Forest planning process. This prevents the building of Forest structures (e.g. roads or bridges) in areas where we may lose an expensive structure long before its estimated lifetime.

Dynamic Quasi-Equilibrium

Definition and Overview

Alluvial river channels operate in a state of dynamic quasi-equilibrium. This simply means that the river adjusts to the variations of water and sediment imposed on it. Those variations are responsive to the natural climatic variation, the underlying geology, and to geomorphic processes. For example, one year there may be a large flow event with several landslides, while another year may bring a drought and fire. So over a short geologic time span a river may see great fluctuations in runoff and sediment load. Dynamic equilibrium implies that the balance between sediment transport in and out of the stream channels remains roughly equal over time (Bates and Jackson 1987). A stream channel in quasi-equilibrium maintains that the channel morphology fluctuates around a long-term average morphology. Stream channels adjust their morphology to accommodate the water and sediment quantities induced by the watershed (Lane 1955; Lisle 1982; Trinity Report 1998). This "natural" variation is hard to define with little or no data to describe the reference conditions. But since stream channels do operate around a dynamic quasi-equilibrium state, the stream channel morphology can be used to examine outside events and processes that affect the stream channels.

Alluvial Channels and Channel Bed Morphology

Stream channels vary throughout a watershed. Bedrock and alluvial, or a combination of both channel types exist in most large watersheds. A channel is alluvial if its bed, banks, and floodplain are primarily composed of the sediments transported by the current flow regime. Alluvial channels are the most likely places to examine and identify adjustments caused by changes in the sediment and flow regimes. Alluvial rivers are classified as meandering, braided or straight channels.

The channel bed morphology also has various patterns such as pool-riffle, step-pool, and cascade. This diversity of channel types and patterns provides different habitat requirements necessary for a variety of plant and animal species. A common way to characterize stream channels is by their geometry.

Hydraulic Geometry

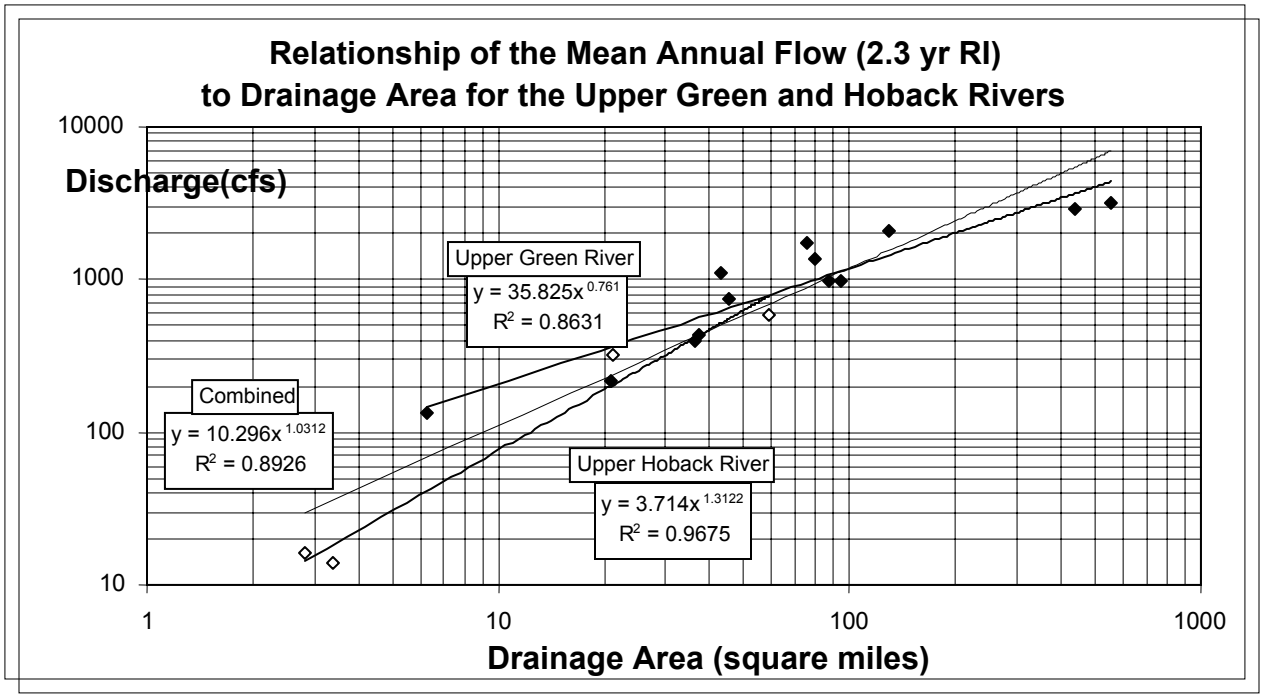
Stream channels within a similar hydrologic region exhibit an orderly change in their geometry with increasing drainage area or discharge (Leopold & Maddock 1953). Hydraulic geometry describes the relations between various channel dimensions (i.e. width, average depth, and average velocity) and discharge. The name derived from empirical graphs describing changes in hydraulic geometry at a station and downstream (i.e. with increasing drainage area) (Dunne & Leopold

1978). Hydraulic geometry provides a way of describing how changes in the water and sediment input affect channel morphology. Appendix B offers a brief introduction to hydraulic geometry. These concepts are applied specifically to the assessment area below.

The U.S. Geological Survey (USGS) has records of all the discharge measurements taken at their stream gauges. Discharge measurements are taken somewhere near the gauge and the gauge height is read so they can all be related. If all the points are plotted, considerable scatter can be seen in the data. However, when the data from one cross-section are used, such as the cable-way, the scatter diminishes considerably. Care should be taken to eliminate measurements when ice coverage is a problem, or when measurements are taken at a bridge that changes the natural cross-section.

Plots of regional at-a-station gauge data for the upper Green and Hoback Rivers (Figure 2.1 below) show that the ordinate values vary greatly but the slopes are similar. To examine downstream hydraulic geometry a similar recurrence interval flow from each river is needed. The mean annual (2.3 year RI) or the higher end of bankfull discharge is commonly used.

Figure 2.1



At-a-Station Measurements

Downstream changes in hydraulic geometry describe how the channel parameters change with increasing drainage area (i.e. discharge). The downstream curves represent similar recurrence interval discharges while the at-a-station curves represent various discharges that occur at a particular gauging site. At-a-station hydraulic geometry plots for the Greys River show little change with time. This is not highly unexpected because the river is flowing through a short bedrock pool where the USGS gauging station is located. However, cross-sections taken from the USGS discharge measurement notes (Form 9-275) show periodic bed scour and fill. This is why

repeatable physical measurements (e.g. channel cross-sections, longitudinal profiles, and channel-bed particle size counts) are so important for describing the channel morphology changes. Average two-dimensional measurements cannot accurately quantify channel morphology changes. Yet, they are useful in understanding how various changes in the landscape affect the stream channels and therefore fish habitat.

Lisle (1981 & 1982) described channel changes at various northern California gauging stations. The sudden change in hydraulic geometry due to a large flow event (the 1965 flood) and excessive sediment input from extensive roads and logging was followed by a slow (5-15+ years) return to a near pre–storm state. Some of the channels have little area to change their width so the main change was a decrease in roughness or resistance (i.e. pools filling, bars eroding, and smaller particle sizes). This decrease in bed roughness led to an increase in the transport efficiency of smaller discharges than before the flood, allowing the stream channels to readjust over the next decade.

Bankfull

Definition and Attributes

The floodplain is a relatively flat surface adjacent to a river channel, constructed during the present climate regime and consisting of alluvium transported by the river (Leopold et. al. 1964). Common floods rise up and over the banks spreading out across the floodplain. Similar surfaces that are above the current channel are terraces, which are abandoned floodplains from a different climatic regime. Bankfull discharge or stage refers to the size of flow that just starts to over-top a channel's banks and spill out onto the floodplain. Another important attribute of bankfull discharge is that it exceeds flow depths required for mobilization of the channel bed (i.e. sediment) by at about 20 percent (Parker 1979; Andrews 1983). This ties in well with Wolman and Miller's (1960) and Andrews' (1980) analyses of how bankfull flow is the channel forming or effective flow. They show that moderate flows (i.e. bankfull) are the most effective at maintaining the channel in dynamic-equilibrium, because large flows happen too infrequently and lower flows don't actively transport sediment. This does not mean that high and low flows don't have important influences on the streams. High flows cause the major channel migrations and remove older riparian vegetation providing new channel diversity and open areas for establishing younger riparian vegetation. Low flows, conversely, provide growing time for riparian vegetation or desiccation.

Relations to Hydraulic Geometry

Bankfull discharge is commonly correlated to a flow within the 1.5 to 2.3 year recurrence interval range on an annual maximum flood frequency graph (Leopold et. al. 1964; Dunne & Leopold, 1978). Bankfull discharge for Pacific Creek is approximately 2,100 to 2,600 cubic feet per second (cfs). Hydraulic geometry relations for bankfull discharges (1.5 yr. RI) at regional gauges were constructed. Bankfull field estimates from the assessment area (unpublished 2000), the upper Green River region (See Table 16-2 Dunne & Leopold, 1978) and the Hoback and Snake River gauges (Moore 1995) correlate well with the 1.5 year recurrence interval discharges. Therefore, regional (i.e. downstream) hydraulic geometry curves of 1.5 – 2.3 year RI (bankfull) flows provide information to examine regional stream morphology and their range of variation. Downstream hydraulic geometry curves also provide a means for estimating bankfull discharge in ungauged basins. Unfortunately, these regional curves do not allow dramatic changes in geometry to be seen

at specific sites. Also they are not typically derived from reference sites so they should not be used to determine deviations from reference conditions.

Diagnostic Parameters

Width as a diagnostic parameter

Bankfull channel width is one of the most widely used diagnostic parameters for stream channel condition (Dunne and Leopold, 1978). Width is relatively sensitive to changes in stream flow or sediment inputs and easily measured. Stream width data is usually compared to reference reach or literature data from the same stream type to determine if the stream is functioning within dynamic equilibrium. The difficulty appears in defining the limits and thresholds. During stream monitoring studies of the upper Greys River and LaBarge Creek numerous width measurements were collected as part of a study to assess the impacts of grazing on the stream channels. This information has not been fully analyzed so it can not be presented here. However, the data is useful for evaluating the impacts of streambank trampling.

Percent Fines as a diagnostic parameter

The finespotted Snake River cutthroat trout (SRC) (*Oncorhynchus clarkii*) is an Intermountain Region Sensitive Species (USDA Forest Service Intermountain Region, 1991). A fine sediment increase in the Greys River could impact the spawning and rearing habitat for the SRC. Trout typically spawn in pool tails and riffles on the Greys River and its tributaries.

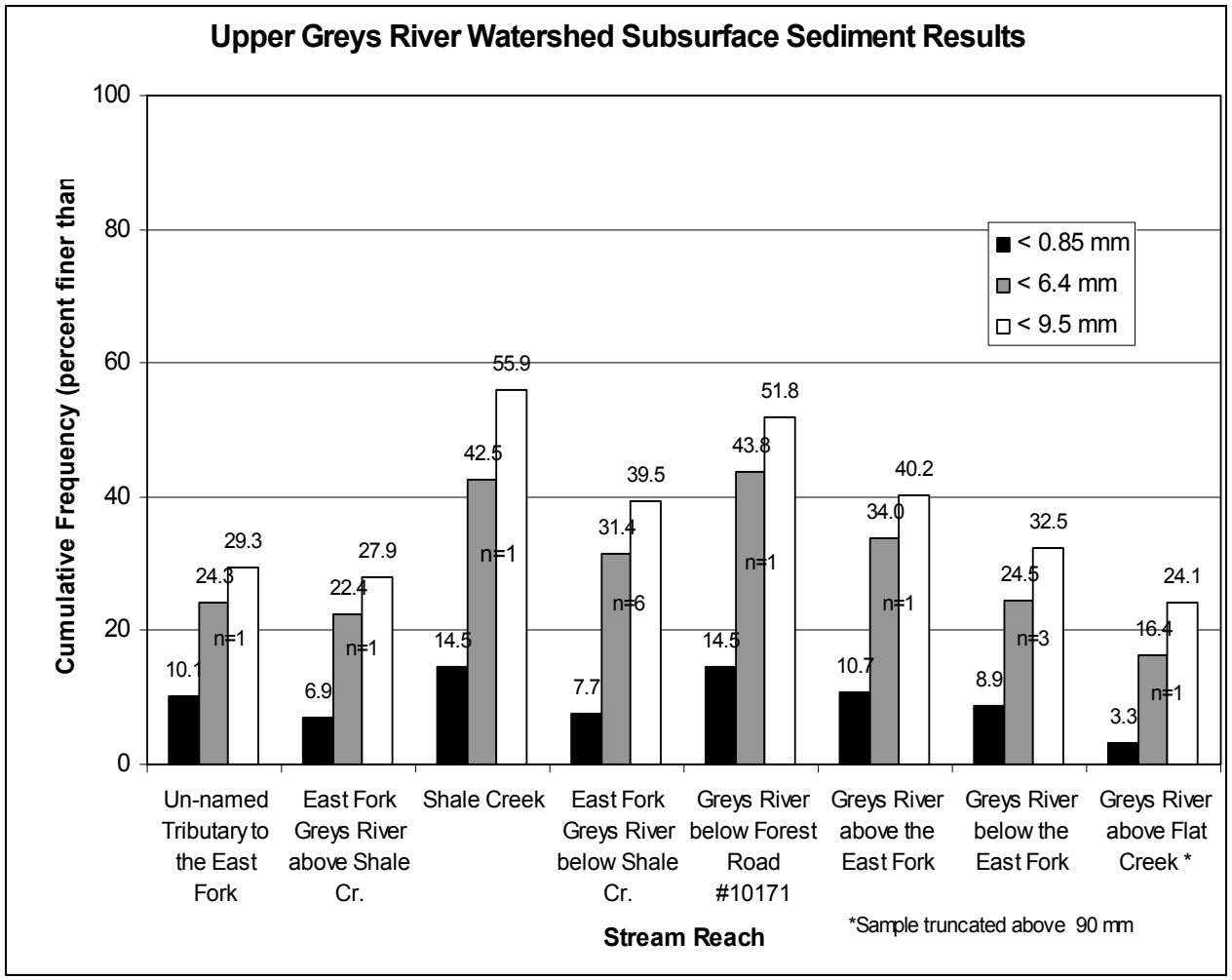
To construct a redd, a trout selects an appropriate site based on the particle size, water velocity, and water depth (Bjorn and Reiser, 1991). The fish then digs a pit by turning on its side and flapping its body. The female lays her eggs in the pocket among the coarser substrate that she can't move, whereupon the male deposits his sperm on the eggs. Finally, the fish moves slightly upstream and buries the fertilized eggs. The particle size distribution covering the eggs is modified by the flow passing over the redd as the fish buries the eggs from upstream. The fish modifies the existing substrate as she builds a redd by loosening the substrate and allowing the flow to selectively transport the particles (i.e. smaller particles move farther downstream). Once the redd is constructed, the shape provides flow through the egg pockets. This supplies dissolved oxygen and removes waste products from the eggs. Water velocity and quantity flowing through the redd is a function of gravel porosity and permeability.

Since we are interested in the survival of trout (i.e. embryos) in the redd and successful trout emergence from the redd, it makes sense to relate trout survival to conditions in the redd. Several researchers (Tappel & Bjornn 1983; Irving & Bjornn 1984; Bjornn & Reiser 1991; Weaver and Fraley 1993) have related survival to the percentage of channel bed fine sediment. If the subsurface material contains a large fine component, spawning fish may not be able to filter out enough fine material to prevent low survival rates. (As stated in the Introduction, high fine sediment loads have been found to reduce survival to emergence of salmonids.) Also, streams with high fine sediment loads tend to transport sediment through the summer, which allows fine sediment intrusion into the redds. This may diminish any benefit gained from gravel cleansing.

An investigative study was proposed to define the existing spawning conditions (i.e. substrate particle size distributions or % fines) occurring in the upper Greys River and the East Fork of the Greys. It was also proposed those percentages be used in predictive survival equations.

Pertinent values from the Greys River and East Fork bulk subsurface particle size distributions are shown in Figure 2.2. These values represent chosen values from the literature that have been related to trout survival to emergence (Irving & Bjornn 1984). The results show higher percent values for Shale Creek and the Greys River in Poison Meadows, and lower values for the upper East Fork and the Greys River upstream of Flat Creek.

Figure 2.2

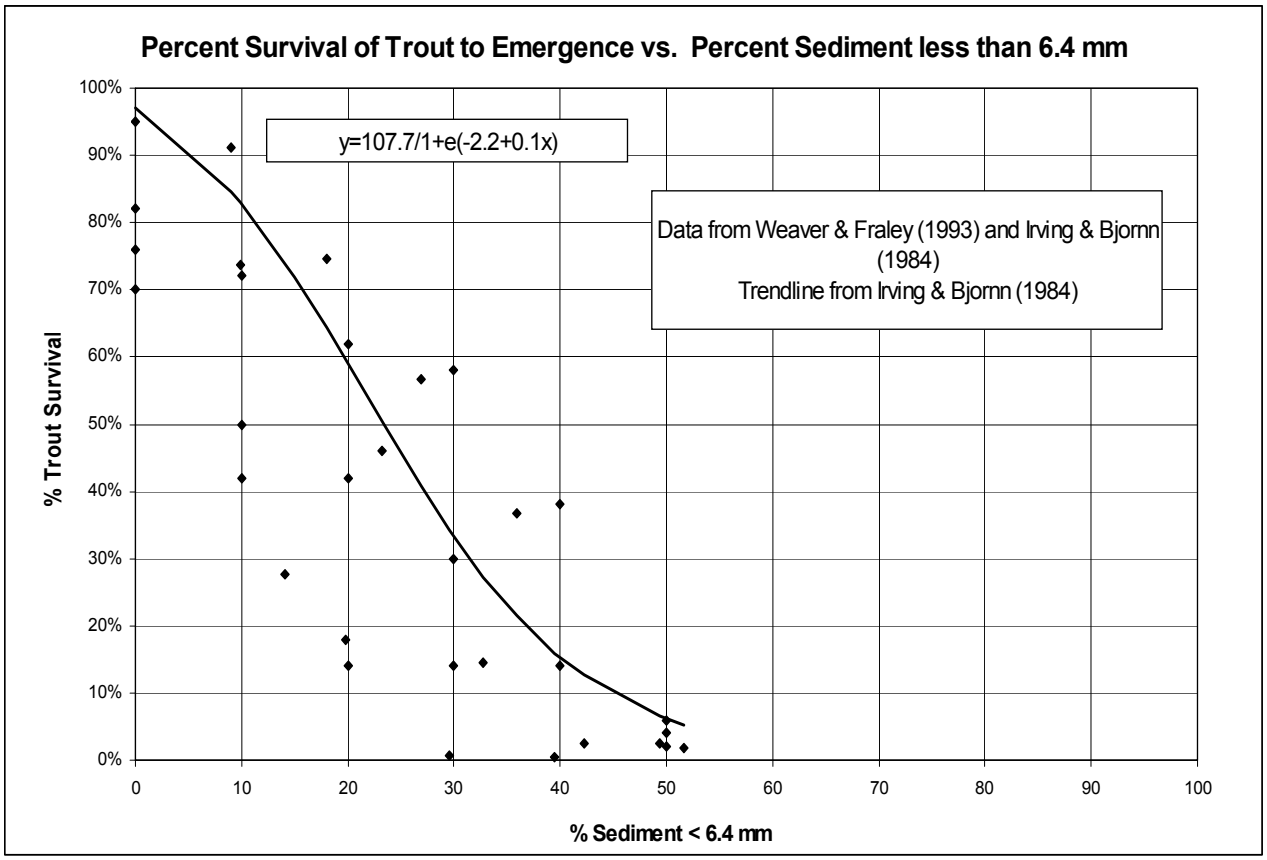


The results are estimates of the sediment percentages in a given stream reach. The East Fork below Shale Creek and the Greys River below the East Fork are the only samples that represent averages (See n=6 and n= 3 respectively). The rest are single samples (n=1) and may not fully represent the individual reaches. Thus we should be careful about how we interpret the data. The East Fork data set shows the variation that can be found in the individual stream reaches. For example, sediment

less than 6.4 mm ranges from 24.7% to 37.0% and averages 31.4%. However, given the time and crew restraints this data set provides an adequate base line for monitoring.

Figure 2.3 shows a downward trend of trout survival to emergence with increasing fine sediment. This is concurrent with Chapman's (1988) critical review of the literature relating fine sediment quantities to survival to emergence, which concluded that percent survival "usually relates negatively to percentages of small fines."

Figure 2.3



There are inherent problems with using the predictive survival equations found in the literature, especially laboratory based data such as Irving and Bjornn's (1984), which fails to accurately reproduce redd conditions found in natural streams (Chapman 1988). However, the trend represented in Figure 2.2 is characteristic of most data published for fish survival to emergence, and provides us with initial values to discuss the potential survival of trout in the upper Greys River. Using the equations derived from Irving & Bjornn's (1984) work we can calculate survival to emergence values. Then we can begin to make management decisions by deciding what approximate survival percentage is needed to help maintain viable trout populations.

Erosion and Sediment Transport

Erosion Processes

Nature produces sediment as episodic (e.g. landslides) and chronic events (e.g. surface erosion). Common erosion processes occurring in the upper Green River LSA include: glaciers, surface erosion, rilling, gullying, landslides (i.e. rock avalanches, rock fall, earthflows, and slumps), and debris flows. First, a brief introduction of the main natural processes and then a discussion on how the various land uses affect the erosion processes, fluvial processes, and the stream morphology will occur.

Streams transport sediment as wash load, suspended, or as bed-load. Wash load is made up of extremely fine particles that transport through the basin without ever settling out. Suspended sediment is very small particles that are suspended by the turbulent eddies throughout the flow. The grains that transport by rolling, saltation, or sliding make up the bed-load component. Bed-load usually approximates 10 percent of the total sediment transported.

Natural and Human Related Disturbance and Recovery Processes

A disturbance is an event that changes the integrity of a system. Most disturbances do not shift a system out of its historic range of variation. Regarding stream channels a disturbance is any change in the supply or routing of water, sediment, or woody debris, which causes measurable change in channel morphology or the biological community. Flora and Fauna have adapted to the various disturbance regimes operating in an area. For example, the cutthroat trout will reoccupy a tributary that has been damaged or cut off by a large landslide once it reopens. When humans modify or add significantly to the disturbances with management activities such as road building a system may be shifted beyond its HRV.

Episodic (pulse) vs. chronic (press) disturbances

Disturbances have different affects on physical processes and landscapes. Sediment production related to disturbances can be classified as episodic or chronic. Disturbances like fire, mass wasting, or flood are considered episodic. These events provide periodic pulses of sediment to the stream channels. Surface erosion is considered a chronic disturbance because it occurs most of the time. For example, during rain storms surface material will run off and during hot, dry days material will slough off (i.e. dry gravel). The important distinction between episodic and chronic comes in evaluating human or management related disturbances. The road system is a good example to work with. It increases both the episodic and chronic sediment production by increasing the bare ground, the drainage network, and destabilizing hillslopes.

Natural disturbances affecting the LSA area

Historical processes

Historical processes give an overall context for how the landscape formed. Glaciation, volcanism tectonics and earthquakes, large-scale hillslope and fluvial processes all have worked on the landscape to help form the current structure. Several important periods of glaciation affected the assessment area with varying effects. Large glaciers covered large portions of the Greys River area during the Bull Lake (140,000 years ago) and Pinedale (15-40,000 years ago) glaciations, while the Little Ice Age (500 BC- 1860) created small cirques in the higher elevations. However, each glacial period had a distinct impact on the valley bottoms and stream channels, creating terraces, scouring and filling the valley bottoms and changing the stream bed elevation.

Volcanic eruptions
The Yellowstone caldera eruptions greatly changed the landscape by abruptly changing the surficial geology and biotic environment. For example, the Huckleberry explosion (2.1 million years ago) blew approximately 600 cubic miles of material into the atmosphere. While other subsequent large scale processes may have greater effects on the current landscape it doesn't take that much imagination to understand the lasting effects the eruption could have. Three gigantic volcanic eruptions occurred in the Yellowstone area roughly 2.1 million, 1.3 million (Island Park Caldera), and 600,000 thousand (0.65 Lava Creek Caldera) years ago. The last eruption created a thirty mile wide crater that contains most of Yellowstone National Park.

Glaciation
Glacial processes and deposits drove the next large-scale changes on the assessment area after tectonics/mountain building and volcanic activity. They created the sculptured cirques of the upper valleys, the lateral and terminal moraines in the valleys and river terraces.

There were several periods of glaciation that influenced the assessment area. The first, the Buffalo Glaciation, occurred approximately 200,000 to 250,000 years ago. The second major glaciation, Bull Lake, occurred between 80,000 and 140,000 years ago. The third glaciation, The Pinedale glaciation period occurred around from 15,000 to 40,000 years ago. The last and smallest glacial period lasted about 2,500 years and had three minor glacial advances. The last advance named the Little Ice Age started ended in about 1860. This was confirmed regionally using ice core data from the Wind River Mountains. Ice occupied many of the assessment area's watersheds and the colder and wetter climate increased ice development. During periods of ice meltoff and retreat the local streamflows increased. The landscape would have reflected these changes through larger streams and more landslides as the ice melted off. Although the ice sheets covering Yellowstone during the major glacial periods did not extend into the Greys River, several glaciers extended down streams such as Corral Creek and Box Canyon.

As the different glaciers advanced down the valley, they transported the loose soil and rock downstream into the lower valley. When the glaciers receded they left terminal moraines (e.g. the high benches behind Corral Creek guard station), lateral moraines, increased stream flows, and sometimes lakes behind the terminal moraines. The melt waters from several different glacial periods reworked the deposited material leaving the extensive terrace sequences throughout the valley.

Tectonics and earthquakes
Large-scale faulting throughout the Greater Yellowstone Area has greatly influenced the landscape. Mass movements along the Overthrust belt created the Salt River and Wyoming Mountain Range. Numerous earthquakes have occurred in the last century some with large effects. For example, north of the assessment area the Hebgen Lake earthquake magnitude 7.5 initiated a large landslide that dammed the Madison River killing several people camped along the river. The Gros Ventre slide was triggered by heavy precipitation, erosion of the toe of an older landslide, bedrock that dipped at 20° toward the river and earthquake activity that occurred two days prior to the slide. There are several active faults in the region, the most notable being the Greys and Salt River faults, which have produced large earthquakes in the past.

Hillslope Processes
The hillslope processes occurring in the assessment area can be divided into general groups (please see the landslide section in chapter 1). In the steep, glaciated headwaters area, rock fall, rock avalanches and slab failures are the predominant processes. The debris from the cliffs deposit massive talus piles or debris cones on the valley floors.

Predominant processes in the lower valleys and surrounding mountains are: surface erosion, dry ravel, soil creep, rilling, gullying, slumping, and landsliding (e.g. earth flows, debris flows, and debris avalanches). The sedimentary bedrock underlying a majority of this area is prone to soils that creep, slump, and slide. This is expressed in the hummocky topography and perched lakes/ponds prominent around the lower basins.

Throughout the assessment area large landslides play an integral role in the formation and maintenance of the existing landscape. Most of the perched lakes and hummocky surface topography is the result of mass land movements. The existing vegetation patterns are partially attributed to the landscape variation created by the various landslide and glacial deposits. Aspen may tend to occupy earthflows because it is a fast growing pioneering species, it favors wetter conditions, and it reproduces mainly root suckers which are stimulated to sprout by disturbance (e.g. soil movement) (Bailey, 1972). Therefore aspens are an excellent primary indicator of the landslide deposits or currently active earthflow areas.

Many of the slides are products of the last several major glacial periods and the underlaying sedimentary geologic deposits. Several other indicators include surfacial features such as hummocky and warped topography, large cracks, changes in vegetation, or exposed bedrock.

Hillslope processes are the principle method for natural sediment transport to the stream channels. Surface erosion and mass wasting are the two dominant processes moving sediment into the stream channels.

Fire
Fire, a natural process, can increase sediment loads and change the water flow regime (e.g. flow magnitude, timing, and overall yield) to a stream system (Ewing, 1995). Many studies have examined regional fire effects on stream channels (e.g. Ewing, 1997; Green & Gerhardt, 1991; Minshall et. al. 1998). The results are extremely variable. Generally, increases in fine sediment are found in the stream-bed and suspended sediment samples (Erwing 1997; Novak 1988; Swanston 1991) following a moderate or larger size fire. The magnitude and quantity of increase sediment is mainly dependent on the burn intensity, size and subsequent hydrologic events. Droughts, floods, and rainfall events all play an important role on the ground surface recovery rate and hillslope sediment transport rates. Fires can also change coarse sediment storage and transport rates. For example, Meyer et. al. (1992) described large changes in the sediment transport and storage rates associated with the Yellowstone fire. Fires can burn logjams which leave large sediment wedges available for transport during the next large flow. If a moderate to large rainstorm hits an area following a fire it is not uncommon to see extensive surface erosion and debris flows down hillslope channels. However, given time to recover streams will return to their approximate

dynamic-equilibrium state.

The most important influence management has on fire is suppression. During the last century this effort appears to have managed to suppress the moderate size fires, increase the number of smaller fires, and potentially increase the size but not the number of larger fires. Although the reference condition curve is conceptual it shows a generally accepted theory of how fire suppression efforts have changed the fire regime. By suppressing the moderate size fires we have increased the smaller size fires, the fuel loading, and the aerial extent of several vegetation community types (see vegetation section). So when a larger fire takes off it has larger fuel loading and more area to burn.

Floods and droughts
The aerial extent and severity of floods and droughts are influenced by the interrelations of moist air flow, topography, temperature, winds, and other climate factors. The largest floods are a combination of large snowpacks, rain-on-snow events, ice dam failures, or landslide dam failures. The periods from 1917-25 and 1964-1999 have been identified as when floods have been more frequent and severe (Druse, 1989).

Droughts are typically defined as periods of drier than normal conditions that result in water-related problems or serious hydrologic imbalance in the affected area (USGS Drought watch). We can see patterns of drought and high water by looking at the Greys River data. In the larger picture we can see similar patterns with the glacial and interglacial periods which correspond to wetter and drier periods respectively.

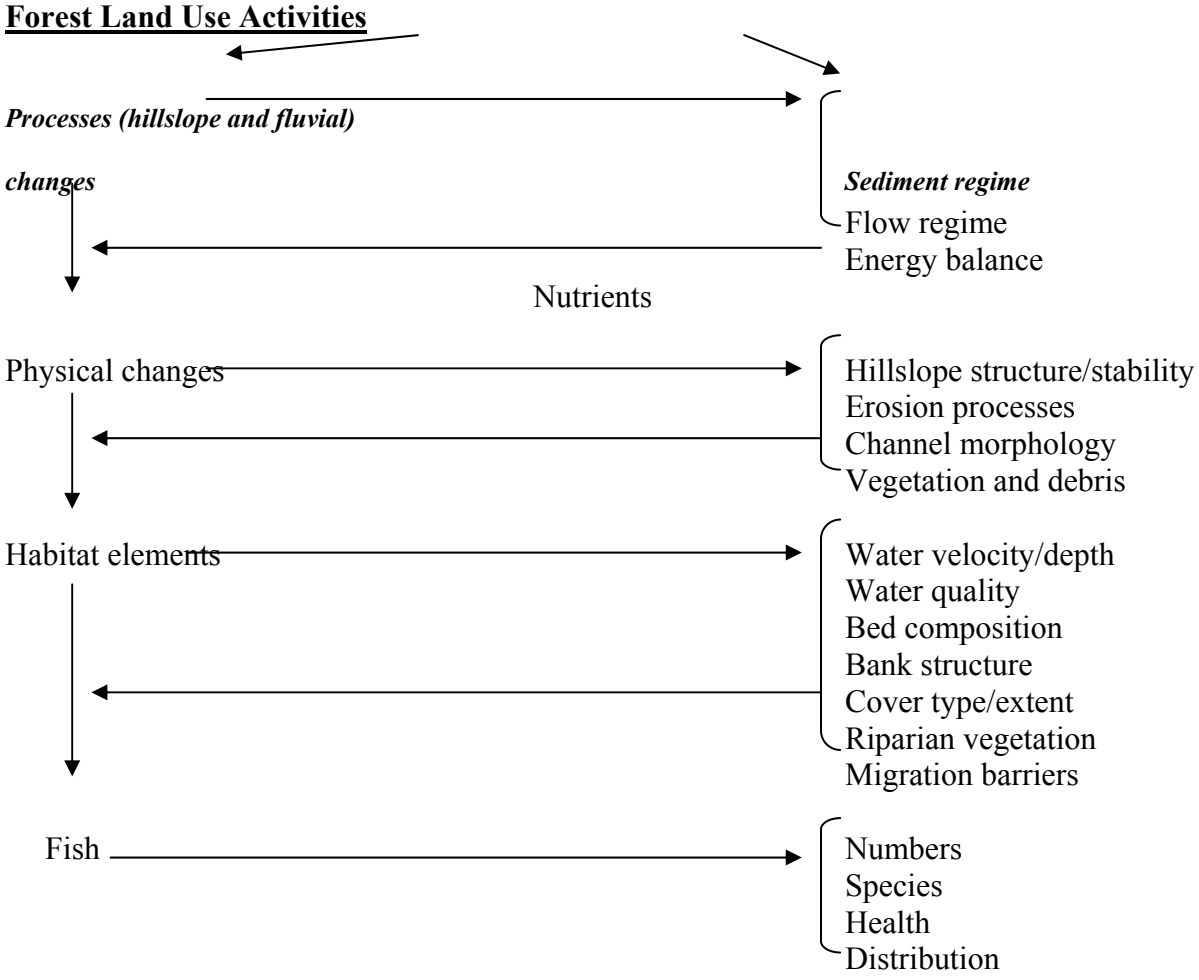
Avalanches
Obviously a small contributor to the overall landscape but an important process for changing vegetation patterns, providing large wood to the stream channel, and moving snow downhill.

Fire
The most important influence management has on fire is suppression (See Fire Management Section). During the last century this effort appears to have managed suppress the moderate size fires, increase the number of smaller fires, and potentially increase the size but not the number of larger fires. Although the reference condition curve is conceptual it shows a generally accepted theory of how fire suppression efforts have changed the fire regime. By suppressing the moderate size fires we have increased the smaller size fires, the fuel loading, and the aerial extent of several vegetation community types (see vegetation section). So when a larger fire takes off it has larger fuel loading and more area to burn.

Human Influences on Hillslopes and Stream Channels

A main concern of land use impacts is on the flora and fauna associated with streams. A modified conceptual model from Chamberlin et. al. (1991) describes the influences land use activities have on the physical processes, structures, and habitat (Figure 2.4 below).

Figure 2.4. Linkages between management activities and fish production (modified from Chamberlin et. al. 1991, figure 6.2.)



More specific impacts on the processes and stream morphology are described by usage.

Beaver Trapping

Beaver (*Castor canadensis*) build dams composed of woody vegetation and fine sediment. The ponds are formed in or adjacent to the stream channels. Beaver dams provide nutrient and sediment storage reservoirs. Water temperatures increase and fine sediment accumulates in ponds allowing fauna to grow. The sediment deposition may bury potential spawning areas but the ponds do create fish rearing habitat. By storing sediment for a short time period (years) the dams may provide "cleaner" gravels downstream for invertebrates and fish over the long term because any flows that can remove the dam are likely to transport the accumulated sediment a considerable distance downstream. Woody debris is also moved into the channel during high events that destroy the dams. High flow events can cause the channel to avulse around the dam creating new channels. This natural migration leaves backwater areas and provides new sediment and woody debris to the channel.

Extensive beaver trapping from 1818 to 1840 decimated the beaver population in the assessment area. Reducing the beaver population may have changed fluvial processes by reducing channel migration (e.g. by avulsion) events, preventing sediment storage and reducing woody debris to the channel.

Ungulate Grazing

"The solution to the livestock-fishery issue is certainly not to argue whether livestock grazing degrades riparian and aquatic systems, but to identify and develop grazing strategies that are compatible with fish habitat productivity." - W. S. Platts (1991)

Livestock affect stream channels in various ways: increased fine sediment (< 8 mm) input, create unstable or trampled banks, increased widths, decreased depths, decreased riparian vegetation, increased water temperatures and water quality changes. Trampled banks increase sedimentation, which increases stream widths, diminishes stream depths (e.g. pools), decreases particle size, and so on. Trampled banks and livestock trails also increase the damage potential (e.g. channel avulsion) during high flows. A bank that livestock trample may appear to lose only vegetation, but when a high flow comes through the bank is easily eroded. The results can be simply more fine sediment and streambank erosion.

Riparian vegetation reductions or species changes can occur from foraging livestock. Reduction or elimination of downstream vegetation may happen below heavily used sections of stream from increased sedimentation (e.g. channel aggradation, widening, or changes in the water table). Enclosure studies give vegetation recovery rate estimates. However, few enclosure studies document changes in channel morphology.

Simple channel cross-sections, longitudinal profiles, and particle size analysis (e.g. pebble counts) would be extremely beneficial. Although stream channels have a "natural" variance, intense local changes can have long-lasting impacts. For example, a meandering stream that is heavily impacted can become a braided channel. Livestock may have small cumulative impacts that only show up after a large flow event (Platts 1991).

Platts (1991) critically reviewed 21 grazing studies to evaluate the impact on riparian vegetation and fish populations. He points out that many of the studies are flawed in their design or they have no pre-grazing data to compare. However, he states that, "the weight of evidence from these studies as a group" shows that riparian conditions and fish populations decline (i.e. channels degrade).

Livestock impacts in the upland areas can induce geomorphic changes. Heavy usage can reduce vegetation and compact soils, which reduce infiltration, increase runoff, and increase erosion (e.g. surface transport, rill and gully development) (Trimble & Mendel 1995).

Timber Harvest

Timber harvest activities affect watersheds by modifying the way water is transported, changing hillslope processes, increasing upland sediment yields, modifying fluvial processes and changing

channel morphology. The following is an example list of effects and potential causes:

1) Increases in the rate and timing of snowmelt runoff by compacting soil, removing vegetation, and leaving forest openings which increase snow retention.
2) Increased roading and stream crossings associated with travel to cut units and transporting logs.
3) Fine sediment increases from surface erosion. Bare or disturbed surfaces accelerate the surface erosion rates from rainfall and snowmelt runoff.

Roads

Forest road systems can adversely affect streams by: increasing sediment loads (e.g. road stream crossing failures, landslides, road surface erosion, etc.), changing runoff rates (e.g. ponding behind stream crossings, diverting flow), and changing stream morphology (Furniss et. al. 1991; Reid & Dunne 1984).

Road-related mass wasting events (e.g. road-induced landslides, road fill failures, and gullying), surface erosion, road construction, and road stream crossing failures generally cause the most impact on watersheds of any land activity. The magnitude and frequency of natural mass movements such as landslides, debris flows, slumps, and earthflows are greatly increased by road systems (Sidle et. al. 1985). Roads change the slope, structure, and flow patterns of individual hillslopes. Improper road placement, insufficient or poor (e.g. side casting material into streams) road maintenance, steep hillslopes, deficiently-sized culverts, and poorly drained roads all lead to increases in hillslope processes (Furniss et. al. 1991).

Many road stream crossings contain large quantities of sediment in the fill prisms. Periodically, these crossings wash out (e.g. culvert plugs with woody debris) or sustain damage (e.g. road is overtopped but not washed out). The sediment is dumped directly into the stream channel. Undersized or improperly aligned culverts can lead to failures during high flow events.

Surface erosion occurs on road surfaces (Figure 2.5 & 2.6 pictures below), cut and fill faces, drainage ditches, and during construction. Road surface erosion is mainly a function of usage, surfacing type, and maintenance (Reid & Dunne 1984). High road usage increases fine sediment delivery to stream channels. Road usage in fish sensitive streams is reduced by closing roads, redirecting through traffic, or moving management activities to other areas.

Forest Road #10171 (Figure 2.5 on following page) has gullies that run for long distances and empty directly into the stream channel. Note that the truck is parked on the road-stream crossing and that the willows define the course of the upper Greys River.

Figure 2.5

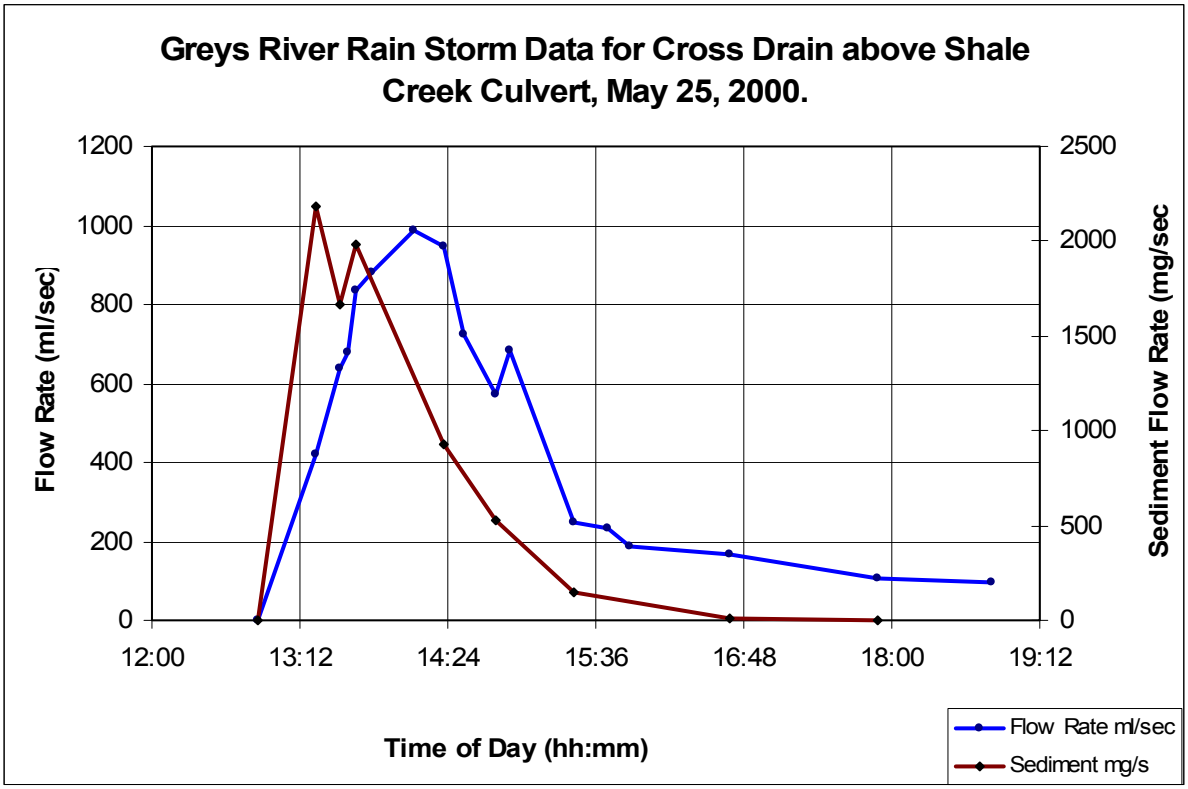
Figure 2.6.

This picture is taken looking downstream at the road-stream crossing (culvert) on Forest Road #10171. The notebook is sitting in a gully that runs for long distances and empties directly into the stream channel.

Proper road design and maintenance can reduce fine sediments entering a stream. The main objective is to disconnect the road drainage system from the stream system. Hydrologically connected roads greatly increase the amount of water runoff and fine sediment that enters a stream

system. A road is hydrologically connected to a stream system if during a design runoff event a continuous flow path is established between any part of the road and the stream system (USFS R5 2000). During the 2000 field season we were able to measure sediment flowing off two sections of road during a sustained spring rainstorm. The lower road segment produced suspended sediment values (Figure 2.7 below) that were much higher than other natural sources in the area and as high as the spring runoff values. During this cold spring rainstorm the road contributed almost all of the sediment to the stream channel in the upper part of the watershed.

Figure 2.7



Road related impacts can occur quickly or take decades. Factors such as vegetation growth, debris and root decay, and when the next large hydrologic event will occur all play an important role.

The flow regimes of the assessment area probably have not changed significantly from timber harvest or the road system, because measurable differences in stream flow become noticeable when roads cover 5 to 10 percent, or clearcuts cover 25 to 50 percent of a basin (BLM 1995). However, some of the tributaries may have changes in their flow regime since the road system was built, especially during rain storms and the spring runoff when surface water is prevented from entering the ground or diverted directly to streams. Flow magnitude increases enhance the erosion potential and therefore increase sediment yields.

Roads affect the channel morphology by increasing sediment loads, changing the flow regime (e.g. ponding behind culverts creates scour below and deposition above), and displacing stream beds. Roads placed on the floodplain, mid-slope in steep terrain, or that cross streams can be expected to

increase sedimentation, while roads built along ridge tops or on high terraces will minimize sediment input to streams. Stream crossings that restrict the channel dimensions can be expected to alter the local channel geometry, the runoff flow-rate, and possibly fish migration.

Stream-road crossings (i.e. culverts or bridges) are common places for inboard ditches to dump water and sediment runoff into the stream system. Culverts can also create passage problems especially for upstream fish migration. All perineal streams in the Forest were surveyed for potential fish passage problems and sediment input locations by the fisheries biologists and their crews during the 1997-2000 field seasons. There are several ways a culvert can prevent fish passage: a perched outlet (too high to jump), a culvert installed at a steep angle (velocities too fast), and a culvert that is too long (the water velocities tire the fish out over the distance).

Disturbance Recovery

Recovery from a disturbance doesn't require the area to be returned to its previous condition. Many disturbances like natural landslides, floods, and fires create desirable changes in the landscape. The system needs to transport watershed products (i.e. water, sediment, woody debris, heat, and nutrients) and create changes in vegetation (e.g. age) to maintain its resiliency and functionality. This is what makes a system dynamic. So only in the short term (10-100 years) is there a dynamic equilibrium state that the system operates around. However, when human disturbances are added to the existing disturbance regime, rehabilitation efforts may be necessary to keep from knocking the system too far out of balance. It may be deemed desirable for the system's health or management needs to do rehabilitation. For example, after a landslide or channel avulsion induced by poor road placement, a rehabilitation effort would restore access to the road while maintaining the river's integrity.

Landscape changes from human uses and activities occur as chronic or short-term disturbances. The upper Greys River road is a chronic disturbance that requires constant maintenance to prevent it from dissolving into the landscape, while a clearcut or temporary skid trail is intended to be rehabilitated to its original state. The original design for either type of disturbance and the time in existence play into what impacts can occur.

During the 1997 high flows a large beaver dam on the East Fork of the Greys River blew out and scoured the channel downstream for some distance. The stream channel widened slightly and took on a more rectangular form. Over the next several years the stream channel slightly narrowed as the willows encroached into the channel and the pools deepened as subsequent flows returned the dynamic equilibrium shape. This process repeats itself on a regular basis and can provide numerous benefits such as temporary storage of fine sediments behind beaver dams until high flows can transport the material through the system or onto local floodplains.

Existing Watershed Condition and Assessment Methods

There are three possible ways to evaluate past changes in watershed condition and assessment of existing watershed conditions (Montgomery & Buffington, 1993):

1. compare existing conditions to reference conditions (or historic range of variability).
2. compare existing conditions to a "pristine" (paired) watershed.
3. compare existing conditions to theoretical predictions.

The existing watershed conditions result from the interaction of the primary (geology, climate, topography, and geography) and derived (soils, vegetation, and water and sediment runoff) elements and the imposed disturbance regimes (e.g. fire, flood, disease, roads, grazing and timber harvest).

Definitions and attributes

Watershed condition is defined as "the state of a watershed based upon physical and biological characteristics and processes affecting hydrologic and soil functions" (USFS Watershed and Air Management Manual 2500), or "the aggregate expression of the physical and biological processes of a watershed related to natural and human disturbances" (USFS R5 rating watershed condition).

The Bridger-Teton National Forest Plan definition of watershed condition is "a description of the health of a watershed as measured against management objectives in terms of the factors which affect favorable conditions of flow and soil capability." Three condition classes are used to characterize a watershed relative to its potential and tolerance. Tolerance is defined as the capacity or ability to endure unfavorable environmental factors without exihibiting unfavorable effects.

Class I – Watershed condition is at or above potential,
Class II – Watershed condition is below potential but can be improved by applied management of improvement measures;
Class III – Watershed condition is at or below tolerance.

Inland West Watershed Initiative (IWWI)

The IWWI is a coarse filter assessment describing the watershed conditions of the 6th field hydrologic unit codes (HUCs) named "sub-watersheds" which range in size from 5,000 to 50,000 acres. The main purpose of the IWWI is "to allow the Forest Service to focus limited federal dollars on the most important watersheds, and to provide for the orderly management of all watersheds over time." Secondary purposes are to:

1) Estimate the probable status of watersheds and aquatic systems so that managers can work with appropriate state and federal agencies to focus subsequent analysis, management, and restoration work on key water resources,
2) Rate watershed vulnerability, geomorphic integrity, and water quality conditions for sub-watersheds (6th field HUCs) as high, moderate, and low given three sets of defined criteria. Geomorphic Integrity describes the existing watershed conditions.

The IWWI is an iterative process and some initial judgments may prove to be wrong later. One of the main values is "to give the Forest Service a sense of direction for further study and work" much like the LSA process.

Geomorphic Integrity

"Geomorphic integrity reflects the soil-hydrologic function as a sponge and filter system to absorb and store water and physical soil-stream resilience. Ratings are based on "Preliminary Professional Judgments" with often limited data (IWWI Protocols 199/). The Geomorphic Integrity reflects current conditions by assessing watershed condition given the watershed's basic elements (e.g.

geology, soils, vegetation, and hydrology) and the disturbance regimes imposed on them. Each watershed is placed in a categorical rating based on three criteria: soil-hydrologic function, properly functioning condition, and dynamic equilibrium. The criteria are defined as:

1) Soil-hydrologic function ≡ the land's ability to absorb and store water based on organic ground cover (plants, litter, humus), soil porosity, and soil structure relative to its natural potential condition.
2) Dynamic equilibrium ≡ the continual adjustment within a HRV of upland, valley, and stream channel morphology by dynamic physical processes, interrupted only by extreme disturbance (reset) events.
3) Properly functioning condition ≡ adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows such as the 25 year flood (modified from the BLM 1996).

Using the above criteria each sub-watershed is rated as high, moderate, and low based on the following definitions.

1) High – The watershed has high soil and water integrity relative to its natural potential condition. Disturbance does not compromise soil-hydrologic function or soil-stream resilience.
    a) Soil-hydrologic function is estimated to be excellent or good throughout the watershed; AND
    b) All streams are estimated to be in dynamic equilibrium relative to their own potential; AND
    c) All riparian areas are estimated to be in properly functioning condition.
2) Moderate – the watershed has moderate soil and water integrity relative to its natural potential condition. Disturbance partly compromises soil-hydrologic function or soil-stream resilience. Recovery can occur naturally or through revised management with minimal investment.
    a) Soil-hydrologic function is estimated to be damaged in isolated areas (e.g. less than 20%) of the watershed; OR
    b) A minor part (less than 20%) of stream miles are estimated not to be in dynamic equilibrium relative to their own potential; OR
    c) A minor part (less than 20%) of riparian miles are estimated to be functioning at risk or non-functioning.
3) Low – The watershed has low soil and water integrity relative to its natural potential condition. Disturbance widely compromises soil-hydrologic function or soil-stream resilience. Recovery requires capital investments and revised management. Management must complement recovery. Criteria are:
    a) Soil-hydrologic function is estimated to be degraded over much (e.g. more than 20%) of the watershed; OR
    b) A major part (e.g. more than 20%) of stream miles are estimated not to be in dynamic equilibrium relative to their own potential; OR
    c) A major part (e.g. more than 20%) of riparian miles are estimated to be functioning at risk or non-functioning.

The IWWI watershed condition assessment displays the existing status of the Forest's watersheds and identifies broad scale disturbance mechanisms. The LSA provides direction for achieving

watershed Desired Conditions.

The IWWI geomorphic integrity ratings (high, moderate, and low) can be equated to the Forest Plan watershed condition ratings (Class I, II, and III). The main difference between the rating definitions is that the IWWI uses three criteria (i.e. dynamic equilibrium, soil-hydrologic function, and properly functioning condition) instead of one (i.e. potential) and the IWWI defines a disturbance threshold for being outside HRV. So the IWWI provides an accepted way (the Intermountain Region uses it) to assess watershed condition. The Greater Yellowstone Area (GYA) Forests and National Parks are putting added emphasis on the IWWI ratings. This is being done by making sure the rating calls are done systematically across the GYA.

Application of the IWWI to the Greys River LSA
The IWWI is a dynamic process that provides an assessment of watershed conditions. The calls are done with existing information and first hand knowledge. The IWWI protocols lead to the rating calls being subjective; however they are effective at accomplishing the objectives described above. The calls are also useful for a first cut determination of watershed condition. The protocols were applied consistently across the Bridger-Teton National Forest and the GYA Forests and National Parks. This allows comparison of the results across the Greater Yellowstone Area (See GYCC, 2001).

Several basic assumptions facilitate the use of the IWWI in the LSA process. First the IWWI provides locations of problem areas and identifies the probable causes for deviation from the desired condition. Secondly, a confidence rating and source of information call (e.g. data, observation, or speculation) are established, which allows us to determine if we need more information about a watershed. And lastly, the geomorphic and water quality integrity rating calls represent existing conditions and the high rating category in both represents desired conditions.

IWWI ratings summary for the Greys River LSA
The geomorphic integrity ratings of the sub-watersheds are shown on Table 2.1. There are 11 sub-watersheds in the LSA area with 0 rated as high, 4 as moderate, and 7 as low. The IWWI summary table gives the probable sources for moderate or low integrity ratings.

The assessment area has seen numerous changes in its landscape and management over the last hundred-plus years, with the current landscape influences coming from fire suppression, road building, livestock grazing, and increased recreational use. Today's landscape reflects all of the past and current influences. The most prominent changes the watersheds have seen came with the introduction of the road system and fire suppression. Trends are determined by evaluating conditions at several points in time. Since this hasn't happened, we will make the assumption that we would prefer that the LSA area sub-watersheds all have high geomorphic and water quality integrity ratings. Typically the Forest would use several methods to determine the watershed condition and trend: trend data, several measured points at selected/permanent sites, compare existing and reference to determine deviations for the preferred state.

Table 2.1 IWWI Geomorphic Integrity Ratings

Sub-watershed name (HUC)	Primary Rating	Certainty	Secondary Rating	Certainty	Source of Rating	Sources of Changes
Spring Creek	Low	Very Certain	NA	NA	Extensive data	Roads, timber, harvest, grazing, insects/disease; fire suppression
Corral Creek	Moderate	Very Certain	NA	NA	Limited Data	Roads, grazing, timber, harvest, recreation; fire suppression
Bear Creek	Moderate	Very Certain	NA	NA	Professional judgment	Roads (Cabin Cr.), grazing, timber, harvest (slides in Elk Cr.), fire suppression
Sheep Creek	Moderate	Very Certain	NA	NA	Professional judgment	Roads, grazing; fire suppression
Blind Bull Creek	Low	60-70%	Moderate	40-30%	Professional judgment	Grazing, roads, fire suppression, timber, harvest, recreation; mining
Deadman Creek	Low	60-70%	Moderate	40-30%	Professional judgment	Grazing, roads, recreation; fire suppression
White Creek	Low	Very Certain	NA	NA	Limited Data	Roads, grazing, recreation; fire suppression
Murphy Creek	Low	60-70%	Moderate	40-30%	Professional judgment	Recreation, grazing, roads, fire suppression; timber harvest
Upper Little Greys River	Low	70-90%	Moderate	< 20%	Limited Data	Roads, grazing, other natural events (landslides), insects/disease; fire suppression
Lower Little Greys River	Low	Very Certain	NA	NA	Limited Data	Roads, recreation, fire suppression, grazing; noxious weeds
Squaw Creek	Moderate	60-70%	Low	40-30%	Professional judgment	Recreation, roads, fire suppression, landslides; timber harvest (steep slopes)

Most human activities in the LSA have some influence on the upland and the stream channels. The preceding discussions point out some of the impacts various resource activities have on streams: increased sedimentation, changes in the riparian vegetation, and changes in the channel morphology, e.g. stream width, depth, particle size, etc. Each activity has an influence. Roads tend to have the greatest related impacts on hillslope and fluvial processes and therefore channel morphology. This is because they touch all physical aspects of the watershed (e.g. uplands, floodplains, cross streams) and receive considerable usage, and because they are always there. Fire suppression has also greatly influenced the vegetation communities and therefore the hydrologic cycle on the ground.

Ecological Status of the Riparian and Aquatic Habitats

The Greys River, Little Greys River, and their tributaries provide spawning, rearing, and adult habitat for several game and non-game fishes (Table 2.2), and support a significant recreational fishery. The Greys River is designated a sport fishery of statewide importance, Class 2 - very good trout waters, and the Little Greys River is designated as a sport fishery of regional importance,

Class 3 - important trout waters, by the Wyoming Game and Fish Department. Tributaries are typically Class 3 or Class 4 - low production trout waters; a few tributaries are Class 5 - very low production, or not classified.

Table 2.2. Game and non-game fishes of the Greys River drainage, native or non-native status, and abundance.

Species Name	Native (Y/N)	Abundance
Snake River Cutthroat Trout	Y	Abundant
Mountain Whitefish	Y	Common
Brown Trout	N	Rare
Brook Trout	N	Rare
Golden Trout	N	Rare
Rainbow Trout	N	Rare
Mountain Sucker	Y	Rare
Utah Sucker	Y	Common
Mottled Sculpin	Y	Abundant
Bonneville Redside Shiner	Y	Common

Management Indicator Species

Native cutthroat trout are the aquatic species whose population levels indicate the effects of forest management activities on the habitat on which they depend (USDA Forest Service 1990). Finespotted Snake River cutthroat trout (*Oncorhynchus clarkii* subsp.) occur in available habitat throughout the Greys River drainage.

Forest Service Threatened, Endangered, and Sensitive Species

The analysis area provides habitat for one Intermountain Region designated sensitive species (USDA Forest Service 1991), the finespotted Snake River cutthroat trout (SRC). This species is considered sensitive due to its limited distribution in the upper Snake River subbasin from above Jackson Lake to Palisades Reservoir in Wyoming and Idaho, and limited knowledge as to its distribution of subpopulations, habitat requirements and habitat condition.

Wyoming Department of Game and Fish Management Concepts

The principle management objective of the Wyoming Game and Fish Department for the Greys River and Little Greys River drainages is to preserve the wild trout fishery and the integrity of the indigenous Snake River cutthroat trout (Gipson et al. 1995). Table 2.3 on the following page describes management concepts for the major waters in the drainage.

Table 2.3. Water name, length or acres, management concept, and species managed for in major waters as identified by the Wyoming Game and Fish Department.

Water Name[1]	Miles or Acres	Management Concept	Management Concept
Greys River (lower)	13	Catchables	SRC
Greys River (upper)	48	Unique Species	SRC
Barstow Lake	20	Wild	SRC
Lower Murphy Lake	5	Catchables	SRC
Little Greys River	19	Wild	SRC
McCain Creek	3	Wild	SRC
Meadow Creek	3	Wild	SRC
Steer Creek	3	Wild	SRC
Waterdog Lake	2	Catchables	SRC

[1]Major waters are defined as those with a potential use of greater than 99 angler days per acre/mile per year.

Snake River Cutthroat Trout Abundance

Population estimates for SRC were completed by the WYG&F prior to the initiation of special regulations on the Greys River in 1988, and repeated after six years of implementation in 1994 (Gipson et al. 1995). Data indicate that compliance with the regulations had helped to increase the maximum size of individual fish in the population. That may have also resulted from fewer anglers fishing the special regulations section. Also, consistent numbers of trout 11 to 16 inches indicate these fish are occupying available over-winter habitat. While estimated total fish abundance declined from 1988 to 1994, fish >16 inches comprised 2% of the population; no fish over 16 inches were observed in 1988. The decline in numbers of trout less than 11 inches may have been a result of poor recruitment. Recruitment of juvenile fish to the population had likely declined due to persistent drought conditions into the early 1990's, combined with typically late emergence of trout fry due to cold water temperatures.

Snake River Cutthroat Trout Metapopulation

The SRC population within Greys River drainage is comprised of a metapopulation - a population of populations (Hanski 1991; Hanski and Gilpin 1991). This metapopulation includes core areas in the mainstem Greys River and Little Greys River, and numerous smaller populations in the tributaries (Harrison 1991). The distribution of smaller populations is dependent upon connectivity to the core population and availability of suitable habitat within the tributaries. The core population may vary but remains relatively stable over the long-term, while smaller tributary populations are more likely to experience periodic extinction. The probability of populations inhabiting tributaries across the Greys River landscape reflects the rate of local extinctions balanced against

recolonization. Historically extinctions would have occurred due to natural disturbance (i.e., debris torrents). More recently, disturbances may also include introduction of non-native trout, habitat destruction due to management activities, disease and over-exploitation by anglers.

Fish Habitat - General

The watershed consists of fifteen 6th code hydrological units (HUC).
HUCs of concern from a Water Quality stand point include Three Forks, Deadman Creek, Murphy Creek, Meadows Creek, Lower Gulch Creek, and McCain Creek. HUCs vulnerable to damage from unstable landforms include Sheep Creek, Deer Creek, Deadman Creek, Meadows Creek, Lower Gulch Creek, and South Fork. Damaged stream segments in Greys River, Murphy Creek, Little Greys River, Sheep Creek, Deadman Creek, Blind Bull Creek, and Shale Creek are due to road segments encroachment into the stream riparian zone.

Amount of pool is likely the habitat feature most limiting fish populations in the Greys River and Little Greys River drainages. This is a result of two factors. Lack of formative features such as large boulders, LWD, or meander formed lateral scour; and second, pool filling by fine sediment. Fine sediment is likely also resulting in depressed aquatic macroinvertebrate production and salmonid spawning success. To what degree these habitat conditions are a result of the natural potential of the watershed and within their historic range of variation, or a result of management activities is unknown.

Greys River Instream Flow Investigation

The WYG&F management goal for the Greys River is to maintain or improve the existing SRC fishery. Maintaining adequate instream flows is important to help realize this goal (Bradshaw and Annear 1993). Objectives of the instream flow investigation were to determine flows necessary to: 1) maintain adequate habitat conditions during winter; 2) maintain physical habitat for all cutthroat trout life history stages; and 3) maintain the existing quality of adult cutthroat trout habitat.

Aquatic Macroinvertebrate Sampling

Overall, the aquatic macroinvertebrate assemblages in the Greys River were made up of a mix of pollution tolerant and pollution intolerant taxa. Higher than expected levels of fine particulate organic matter (FPOM) is the main water quality impairment indicated by the data.

Fish Habitat Improvements

A variety of fish habitat improvement activities have been completed in the Greys River and Little Greys River drainages (Table 2.4). Goals of river habitat improvements have been consistent over the years: 1) increase pool habitat for SRC; 2) increase cover for SRC; and 3) reduce stream bank erosion. Objectives to increase scour and pocket pools, increase pool depth, provide cover, improve channel stability, and encourage growth of riparian vegetation have been very successful. Monitoring has shown greater than 90% of structures listed in Table 2.4 were functional in 1997, and being utilized by SRC. In general, placement of boulders and trees in combination, or large aggregates of trees as LWD jams have been more successful than individual boulders or trees. The rock gabion dam constructed at Lower Murphy Lake was intended to increase surface area, water depth, and lake volume for the family oriented catchable fishery. Lower Murphy Lake continues to be a very popular fishery for stocked SRC.

Table 2.4. Number, location, and year of fish habitat improvements structures constructed in the Greys River and Little Greys drainages.

Structure Type	Number	Stream or Lake Name	Year Constructed
Revetment	1	Little Greys River	1987
Rock Weir	3	Little Greys River	1989
Cover Log	8	Little Greys River	1989
Revetment	3	Little Greys River	1989
Digger Log	9	Little Greys River	1989
Wing deflector	3	Little Greys River	1989
Diversion Log	1	Little Greys River	1989
Boulder Cluster	3	Little Greys River	1989
Cover Trees	11	Little Greys River	1991
Rock Weir	1	Little Greys River	1991
Rock Weir	3	Little Greys River	1991
Wing deflector	2	Little Greys River	1991
Cover Trees	2	Little Greys River	1993
Wing Deflector	2	Little Greys River	1993
Cover Trees	5	Little Greys River	1995
Rock Gabion Dam	1	Lower Murphy Lake	1968
Boulder Cluster	9	Greys River	1980
LWD jam	4	Greys River	1994
Cover Trees	2	Greys River	1994

Trends and Properly Functioning Condition
Data for the Greys River and Little Greys River indicate existing cumulative effects from unstable landforms, and management activities may reduce fish abundance and moderately degraded fish habitat. The most significant affects from management appear to be lack of pool habitat and high amounts of fine sediment.

Vegetation Communities

Forested Vegetation - Background

The Greys River Landscape Analysis area lies in the Greys River drainage between Alpine, Wyoming on the north and the Tri-basin Divide on the south. Elevations range from 5,600 feet at Alpine, WY to 11,380 feet Wyoming Peak. The area is located between the Wyoming Range and the Salt River Range of mountains. Slopes primarily are east and west facing.

The area is approximately 285,450 acres in size. Approximately 211,075 acres are forested (73.9% forested). Approximately 74,366 acres are non-forested (26.1%). Approximately 50,885 acres is sagebrush-grass (17.8%); approximately 6,592 acres are riparian (2.3%); and approximately

16,890 acres are rock (5.9%). The forested vegetation consists of lodgepole pine, Douglas-fir, Engelmann spruce, subalpine fir, whitebark & limber pine, and aspen (listed in order of frequency and occurrence).

Lodgepole pine comprises approximately 63,890 acres (30.3%) of the forested Greys River drainage. Douglas-fir makes up approximately 63,078 acres (29.9%); Engelmann spruce covers approximately 28,559 acres (13.5%); subalpine fir comprises approximately 25,144 acres (11.9%); whitebark-limber pine grows across approximately 21,225.3 acres (10%); aspen lives on approximately 9,180 acres (4.3%). Approximately 175,200 acres (83.0%) of the forested lands are greater than 100 years of age.

Harvest & Fire History

Flora in the Intermountain West Region today is essentially the same as it existed at the initiation of the Quaternary Period some 2,000,000 years ago, as evidenced by the pollen fossil record. Plant assemblages were sagebrush grass shrub in the arid steppe of the lowlands and coniferous forests in the mountains. The Pleistocene, or Ice Age, is estimated to have comprised some 600,000 to 1,000,000 years in that period. Four major glacial advances occurred here and around the world. Plant communities migrated with fluctuations in changing climate during these glacial and interglacial periods. They moved up and down the elevational gradient as well as shifting north or south depending on prevailing conditions. Our modern plant communities developed over a significant period of time with adaptations to disturbance (fire) and herbivory. (Tidwell, et al. 1986)

Fire has been the dominant natural disturbance affecting structure, composition, and pattern of forest vegetation. Fire intervals vary by aspect, slope, and elevation, as well as species composition. The effects of fire suppression have varied among the different Fire Groups (Bradley et al., 1992) outlined in Chapter 1.

In the cold, upper sub-alpine and timberline habitat types (Fire Group 8), fire was relatively infrequent. The natural fire-free interval is in the range of 50 to 300 years, so the era of fire exclusion has not lasted long enough to generally move these habitats outside of a natural range of variation. However, there is a problem developing with whitebark pine. This keystone species is threatened across its range by blister rust. Fire exclusion is contributing to the problem by allowing competing shade-tolerant species such as subalpine fir to become established in the understory. In the absence of disturbance, whitebark pine can be lost through natural succession to these other conifers. Also, subalpine fir in the understory serves as ladder fuel that can generate crown fires that kill the overstory trees. Large crown fires can reduce or eliminate the whitebark seed source needed to regenerate the species.

In most of the mid and lower elevation conifer-dominated habitat types (Fire Groups 2-7), fire exclusion had contributed to forest health crisis in regards to insect and disease impacts. Bark beetles and other mortality agents are increasing in the vast expanses of mature and old conifer forest. The number of live conifer trees on the landscape and the amount forest currently in the older age classes is likely outside of a natural range of variation. This has set the stage for widespread tree mortality due to insects and disease. This in turn will generate increased fuel loads

at the landscape scale capable of supporting very large, severe wildfires. The current situation is quite different from a natural fire regime that would have included many more small to medium sized fires of mixed severity. The natural fire regime would have limited the potential for very large fires, which still would have occurred, but much less frequently.

Fire exclusion has been a major factor affecting the aspen-dominated habitat type (Fire Group 4). Wyoming has lost about half its aspen, primarily through lack of disturbance and succession to conifers. Long term climate change may be a factor, suggested by the general absence of regeneration by seed. There may be more localized impacts from grazing of domestic livestock and browsing by elk and moose. However, aspen is a fire-adapted species that suffers in the long term absence of fire or other disturbances, such as cutting, that kill the above-ground stems but promote regeneration through sprouts off the root system.

Most forest regeneration in the assessment area in recent decades has occurred through timber harvest. In 1950, a portable sawmill was built at Squaw Flat. This mill was moved to private land at Alpine in 1964. Timber harvest production increased and reached approximately 5 million board feet by 1962. In 1963, a large sawmill was constructed in Afton and timber harvest became the biggest single industry in Star Valley. Timber harvested from the Greys River District annually from 1963 through 1970 was approximately 15 million board feet, mostly from the Greys River drainage. With the exception of a few young stands that were initiated following wildfires, the timber stands found on the Greys River are mature and overmature. They are even-aged and for the most part single-storied, for this reason; the prescribed silvicultural system was clearcutting. Over 10 of the 15 million board feet were harvested by this method using tractors on slopes less than 45%. The remaining 5 million board feet of timber resulted from individual tree harvest. From 1970 to 1979, timber production decreased to approximately 3 to 4 million board feet annually. (Greys-Salt River Planning Unit, 1979)

Current harvest accomplishment from 1995 to 2000 using the clearcut method includes 29 acres in the Big Buck Timber sale (25 of these acres used the Coppice method to reproduce aspen and 4 acres salvaged fire killed timber). Current stand conditions throughout the Greys River drainage are conducive to experiencing large fires. The 1988 Corral Creek Fire was 4,380 acres. In 2000 the Blind Trail fire burned across 9,800 acres and in 2003 the East Table fire burned 3,599 acres.

There are approximately 16,380 acres in the stand initiation structure stage. This structural stage can be related to the age class represented by 0 to 40 years of age. Approximately 8,351 acres (51%) were created by fire. Some areas that were burned were also harvested and planted. Approximately 8,029 acres (49%) were created by harvest using clearcutting methods.

Even-aged harvesting using the clearcutting method began in the 1950's. Providing economic benefit and timber products to local communities dominated objectives for harvest in the 1950's. Responding to the outbreaks of Mountain Pine Beetle epidemics and control of insect & disease agents dominated treatment objectives made in the 1960's and 1970's. "Promoting an orderly turnover of plant communities" and providing wildlife habitat dominated treatment objectives in the 1980's (Bridger-Teton. October 30, 1978). Ecosystem Management concepts dominated treatment objectives in the 1990's. However, many issues such as: Roadless Area Initiatives, The

Chief's Natural Resource Agenda, and listing of numerous Threatened and Endangered species have been perceived as barriers to implementing treatments using timber sales. Timber sales as a tool to treat vegetation are on serious decline both locally and nationally on Forest Service system lands.

Harvest (Clearcut) Effect on Hydrologic Function

Timber harvest has affected approximately 9,799 acres in the analysis area over the past 40 years. Approximately 8,029 acres were clearcut and approximately 1,770 acres were selectively cut. Regeneration of these areas occurred through both planting tree seedlings and by natural regeneration from trees remaining after harvest. Approximately 3,692 acres (or 46%) of the total 8,029 acres of clearcuts met cover definitions in the year 1998 and are no longer considered Created Openings. Approximately 2,823 acres (or 35%) of the total 8,029 acres of clearcuts will meet cover definitions by 2008 and no longer be considered Created Openings. The balance of approximately 1,514 acres (or 19%) of the total 8,3029 acres of clearcuts will meet cover definitions by 2018 and no longer be considered Created Openings.

Created openings in DFC 1B are defined in the Forest Plan by the Created Opening Duration Standard (Forest Plan page 157) as "A created opening will be closed when reforestation standard is met and the area begins to take on the appearance of a young forest represented by either 95% of the trees in the cut-over area exceeding 10 feet in height or regeneration provides elk hiding cover from a horizontal ground point of view." The Reforestation Standard for DFC 1B (Forest Plan page 156) states: "A harvested unit will be considered restocked when the minimum standards by forest cover type and site productivity are met. These standards will be met within five years of final harvest.

Forest Cover Type	Site Productivity cu. ft./acre/yr	Trees/ Acre	% of Area Stocked	% Composition
Lodgepole pine	20-49	150	70%	60%
Lodgepole pine	50+	195	70%	60%
Spruce & fir	20-49	50	70%	60%
Spruce & fir	50+	195	70%	60%
Douglas-fir	20-49	145	70%	70%
Douglas-fir	50+	200	70%	70%

Created openings in DFC 10 are defined in the Forest Plan by the Created Opening Duration Standard (Forest Plan page 238) as "A created opening will be closed when 1) it meets reforestation standards; 2) it begins to take on the appearance of a young forest rather than a restocked opening; and 3) it takes on the appearance of the adjoining characteristic landscape represented by an average height of 20 feet or regeneration provides elk hiding cover from an elevated ground point of view." The Reforestation Standard for DFC 10 (Forest Plan page 237) states: "A harvested unit will be considered restocked when the following minimum standards by forest cover type and site productivity are met.

Forest Cover Type	Trees/ Acre	% of Area Stocked	% Species Composition
Lodgepole	400	80%	60% Lodgepole
Spruce & fir	400	80%	60% Engelmann
Douglas-fir	350	80%	70% Douglas-fir

There are 3,692 acres of past clearcuts meeting these standards and have regenerated both sufficiently to be considered cover for wildlife and are no longer considered Created Openings.

Only the application of timber harvest using even-aged management techniques contributes towards the area included in the definition "Created Opening" for both the "Created Opening Duration Standard" and "Created Dispersion Standard" (Forest Plan pages 99-100). The effects of catastrophic wildfire creating even-aged conditions do not contribute towards the area in "Created Openings" as defined by the Forest Plan. However, catastrophic fire does biologically affect hydrologic processes and function.

Approximately 12,688 acres (4,346 acres from timber harvest) are considered Created Openings and do not meet cover definitions. They have tree stocking, but do not meet cover requirements due to tree height. At present, approximately 2,500 acres contribute to the DFC 1B Created Opening Dispersion Guideline (Forest plan page 157). For DFC 1B, this guideline states "not more than 20% of the suitable timber base should be in a created-opening condition over a three-decade period." For DFC 10 Guideline (Forest Plan page 238), "not more than 15% of the suitable timber base should be in a created-opening condition over a three-decade period." At present, approximately 1,846 acres contribute to the DFC 10 Created Opening Dispersion Guideline. Lodgepole pine usually dominates regeneration in harvested and burned areas. Aspen may dominate regeneration in burned areas if it was present prior to burning. Engelmann spruce, subalpine fir, limber pine, whitebark pine, and Douglas-fir establish as site conditions improve and seed source is available.

Information was derived from 1981 Forest-wide Inventories. Information was compared to 1969 Bridger Timber Survey. The 1981 Forest-wide Area Database was used for accurate acreages. Additional site-specific information was used from the FSVEG database for the Greys River District.

Insects and Disease

Historically, the most destructive forest insect has been the mountain pine beetle, *Dendroctonus ponderosea*. Early forest records indicate that control of the mountain pine beetle began in 1929 and continued throughout the Civilian Conservation Corps operations. The biggest early control effort was in 1931 when 18,547 trees were treated in the Greys River area[1]. In 1962 significant mountain pine beetle activity was recorded in the Greys River drainage. Forest-wide by 1967, there were 60,000 infested trees. Tree killing continued and the infestation spread until, by 1971, most of the merchantable lodgepole stands either were seriously depleted, under attack, or immediately threatened (Bridger-Teton, October 1978, page 58). Intense harvest operations

[1] Approximately 6.4 trees/acre were treateted with chemicals.

continued through the 1970's. Outbreaks of Mountain Pine Beetle in the early 1960's and late 1970's caused significant mortality. Damage occurred in lodgepole pine stands. Whitebark and limber pine at higher elevations were also affected by the Mountain Pine Beetle. Existing stands of lodgepole pine are at risk of damage from Mountain Pine Beetle outbreaks. This is due to reduced tree vigor.

Dwarf mistletoe, *(Arceuthrobium americanum)* occurs throughout the analysis area infecting lodgepole pine and Douglas-fir. Infection levels forest-wide affect 30% of the lodgepole pine component and varies from light to heavy infection (Bridger-Teton, September, 1997, page 26). Dwarf mistletoe reduces tree growth; reduces seed crop with less seed per cone and less viable seed per cone; increases mortality; reduces wood quality; and increases susceptibility to rots and windthrow (Bridger-Teton, October, 1978, page 60).

Comandra blister rust *(Cronartium comandra)* is present in overstory lodgepole pine stands. It is responsible for top killing lodgepole pine and total kill of some individual trees.

Subalpine fir has suffered significant mortality from a complex of damaging agents including Western Balsam Bark Beetle, drought, old age, root diseases and decay fungi. Subalpine fir composition in the understory is increasing in many stands. The development of a subalpine fir understory increases fuel loading and provides ladder fuels for fire.

Some spruce beetle activity in mature Engelmann spruce has caused scattered mortality. Hazard for future outbreaks is moderate where concentrations of mature spruce occur.

The Old Forest Single-Strata and Old Forest Multi-Strata stand structure dominate the Greys River watershed. The Old Forest Multi-Strata stand structure is generally 2-storied with a mature and overmature overstory that is dominated by an understory of shade tolerant species. The Old Forest-Single Strata stand structure is single-storied with a mature and overmature overstory and may be in the process of developing an understory of shade tolerant species.

An analysis of the area for the Upper Greys timber sale findings include: site index averages approximately 51 at age 100 for the dominant lodgepole pine cover type. Basal area of the overstory ranges from approximately 60 square feet to 200 sq. ft. with an average of approximately 100 sq. ft. There is an average of approximately 168 trees per acre greater than 5 inches in DBH with a range of 90 to over 200 trees per acre in the overstory. Understories in measured stands for trees less than 5 inches in DBH ranged from 1,740 to 3,233 trees per acre with subalpine fir dominating. Existing plantations average 5,660 trees per acre with both subalpine fir and lodgepole pine dominating the frequency of occurrence. Average height of overstory trees is approximately 70 feet and the quadratic mean DBH is approximately 13.6 inches. Approximately 5-20% of the overstory is dead. A portion of live trees in the overstory have dead tops. Forest fuels loading exceeds 12 tons per acre in older stands. They are characterized by large down logs from tree mortality in the overstory.

Age-Function

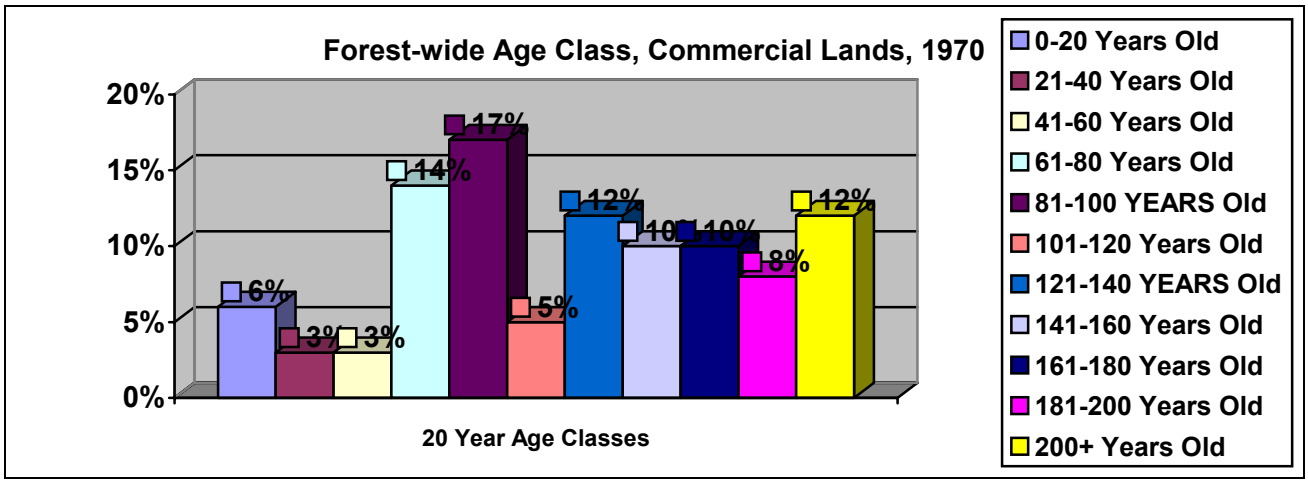
Approximately 66% of the Bridger-Teton National Forest is forested. In 1970, (forest-wide) approximately 57% of all forested acres were represented by mature and overmature stands over 100 years of age. The remainder of the forested area is younger in age and composed of immature or smaller sized trees. (Bridger-Teton, October, 1978, page III-19 and 24). A 1990 analysis calculated that forest-wide, 68% of the forested areas are over 100 years of age. A projection of that analysis estimates (using the current rate of creating new age classes of forest), by the year 2010, 80% of the forested areas will be greater than 100 years old.

In 1970, (forest-wide) approximately 53% of the lodgepole pine acres were represented by mature and overmature stands over 100 years of age. (Bridger-Teton, October, 1978, page III-19 and 24). A 1990 analysis calculated that forest-wide, 66% of the lodgepole pine areas are over 100 years of age. A projection of that analysis estimates (using the current rate of creating new age classes of forest), by the year 2010, 81% of the forested areas will be greater than 100 years old. The average age of stands on the Bridger-Teton is getting older.

Table 2.5
Forest-wide Commercial Forest Land Area (%) by Age Class & Local Working Group 1970

Age Class years	Total Acres by 20-year Age-Classes	Lodgepole, Whitebark-Limber pine	Engelmann spruce & Subalpine fir	Douglas-fir	Forest Totals
Acres		394,635 Acres	396,517 Acres	165,695 Acres	956,847
0-20	54,981	5.5 %	8.3%	0%	6%
21-40	27,420	2.7 %	3.3%	2.3%	3%
41-60	29,193	3.1%	2.5%	4.2%	3%
61-80	140,431	17.3%	9.6%	19.3%	14%
81-100	169,031	18.4%	19.5%	9.8%	17%
101-120	53,561	5.4%	6.2%	4.2%	5%
121-140	114,214	11.5%	13.8%	7.7%	12%
141-160	94,783	5.8%	11.7%	14.8%	10%
161-180	95,429	11.0%	8.3%	10.7%	10%
181-200	78,753	10.8%	4.1%	11.4%	8%
200+	111,308	8.5%	12.7%	15.6%	12%
Totals	956,847 Acres	100%	100%	100%	100%
		52.9% > 100 yrs	56.8% >100 yrs	64.4% > 100 yrs	57% > 100 yrs

Table 2.6



This above information is current for the year 1970. There is a pronounced effect of successful fire suppression in the above display of age-class 0-60 years. Fire suppression has reduced the number of acres that would have been created in each of the 20-year age classes since 1910.

Table 2.7 Projection Forest-wide Commercial Forest Land Area (%) by Age Class[2]

Age Class	Year 1970	Year 1990	Year 2010
	956,847 Acres	956,847 Acres	956,847 Acres
0-20	6 %	5%	2%
21-40	3 %	6%	5%
41-60	3%	3%	6%
61-80	14%	3%	3%
81-100	17%	14%	3%
101-120	5%	17%	14%
121-140	12%	5%	17%
141-160	10%	12%	5%
161-180	10%	10%	12%
181-200	8%	10%	10%
200+	12%	15%	23%
Totals	100	100%	100
	57% >100 yrs	69% >100 yrs	81% > 100 years

[2] Projections done by Jim Robertson, (simple mathmatical projections assumed).

Table 2.8

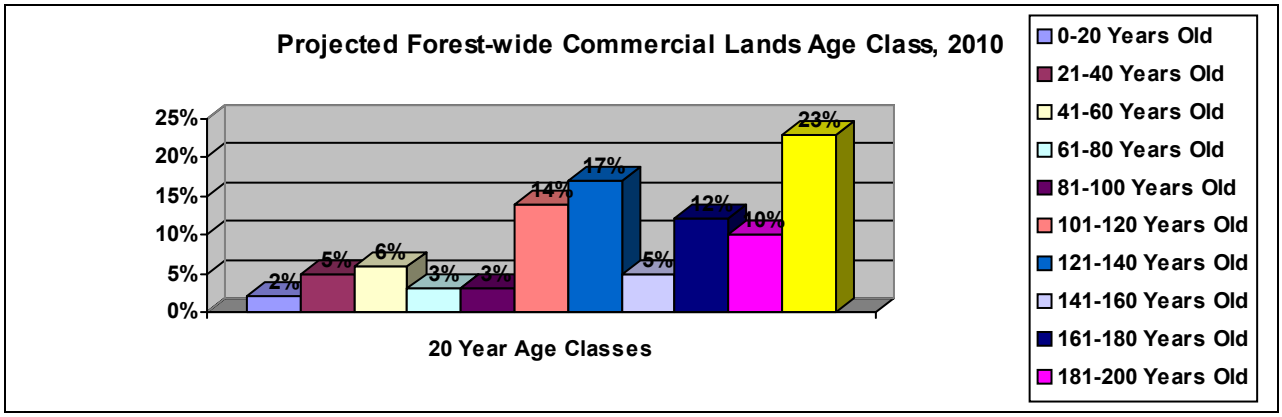


Table 2.9 Average Forest Age, 1985 Forest-wide Inventory.

Species	Average Age	Oldest Tree Found & Cored
Cottonwood	128 Years	(Only 9 trees sampled)
Aspen	71 Years	228 Years Old
Lodgepole Pine	121 Years	312 Years Old
Whitebark Pine	174 Years	350 Years Old
Limber Pine	161 Years	361 Years Old
Engelmann spruce	167 Years	440 Years Old
Subalpine fir	104 Years	240 Years Old
Douglas-fir	161 Years	469 Years Old

The analysis of species composition for the Greys River LSA tied age to stand structure. Detailed information is available for review and will be used in the NEPA process for any forested vegetation projects.

Table 2.10 Greys River Species by Age Classes by Approximate %

Species	Total Acres	0-40 Years Old	41-100 Years Old	101+ Years Old	Total %	Treatment Priority*
All Forested Areas	206,873.3	7.9%	7.1%	85.0%	100%	
Lodgepole pine	62,683.9	13.2%	17.7%	69.1%	100%	3
Douglas-fir	62,723.8	6.8%	3.6%	89.6%	100%	2
Subalpine fir	24,051.4	7.1%	2.1%	90.8%	100%	1
Engelmann spruce	27,872.2	6.3%	0.2%	93.5%	100%	1
Whitebark & Limber pine	20,716.1	0.7%	3.3%	96.0%	100%	1
Aspen	8,830.9	2.5%	0	97.5%	100%	1

* Treament Priority: 1= greater than 90% over 101 years; 2=80-89% over 101 years; 3= less than 80% over 101 years old

Figure 1. Age Class-All Forested Types, Greys River

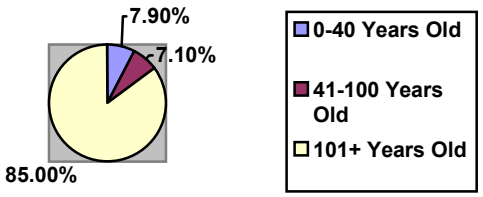


Figure 2. Age Class Lodgepole Pine, Grey's River

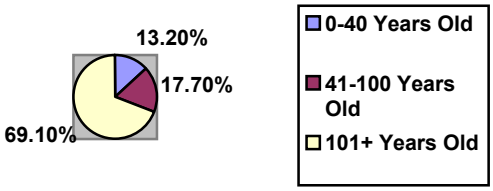


Figure 3 Age Class, Douglas-fir, Greys River

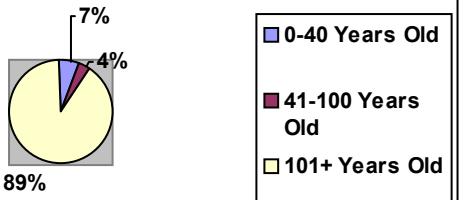
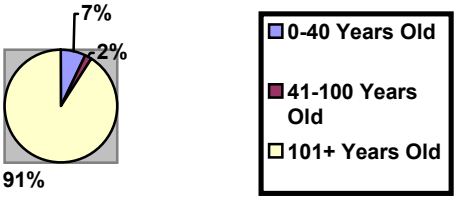
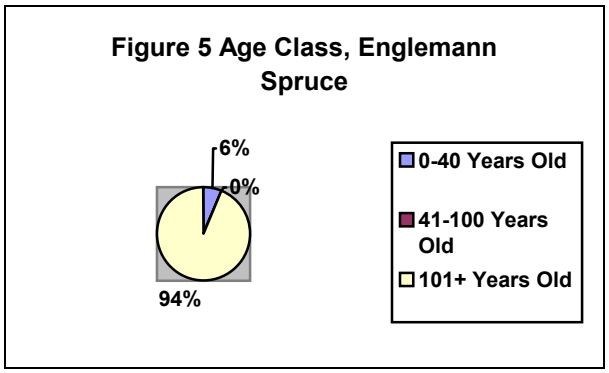
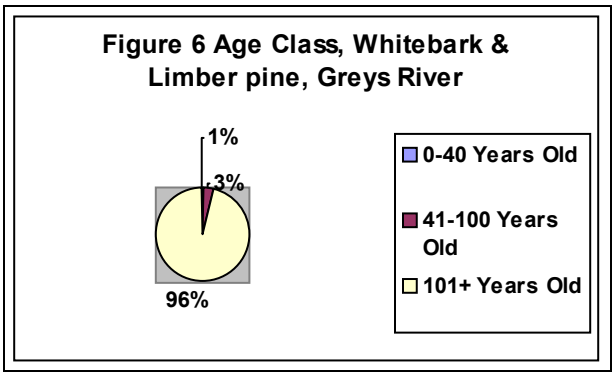
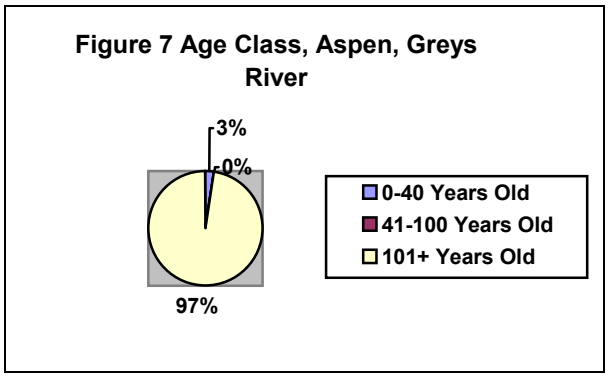


Figure 4 Age Class, Subalpine Fir, Greys River









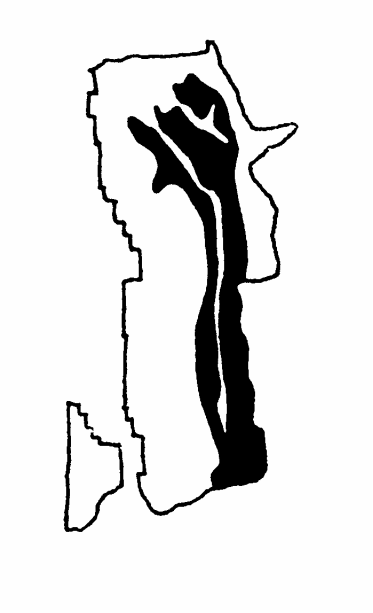
Commercial Forest Lands

The 1978 Bridger-Teton timber management plan stratified productive forestlands. Productive forestlands are defined as those capable of producing 20 cubic feet per acre per year (20 cu.ft./ac./yr.). Forest-wide, there are approximately 1,545,780 acres of productive forestland on the Bridger-Teton National Forest. This represents 46% of the forested lands as productive forests.

Productive forestlands were defined as reserved, deferred, or commercial. Reserved and deferred lands are withdrawn from timber utilization by statute, withdrawn from timber utilization by administrative regulation (Code of Federal Regulations), withdrawn by designation in land use plans approved by the Regional Forester, or withdrawn from timber utilization pending further study.

Regulated Commercial forestlands were standard, special or marginal. Standard commercial forestlands are areas on which crops of industrial wood can be grown and harvested with adequate protection of the forest resources under the usual provisions of the timber sale contract. Special commercial forested lands are those needing specially designed treatment of the timber resource to achieve landscape or other key resource objectives. Marginal commercial forested lands are those with excessive development costs, low product value, or resource protection constraints. Economics of these categories have changed over time.

Relationship to Past Management Documents



The Greys-Salt River Planning unit Final Environmental Statement and Land Management Plan identified Management Unit 1-2 (Figure to left) of Low and Mid Slope (approximately 132,000 acres) in the Greys River drainage as suitable for timber and grazing activity. "Most of the timber activity on the Greys River Ranger District, both past and future, has been and will be carried on in this unit." Most of the 100 million board feet of timber harvested on the District in recent years came from this management unit. The majority of the harvested timber has been mature, overmature, and decadent stands. This will also be the case in future timber sales. (page 132-3). Much of this area contained the standard, special and marginal commercial forested lands.

Since 1971, however, timber production from the planning unit has decreased to approximately 3-4 million board feet anually. Logging on a scale larger than 3 million board feet annually would depend on the use of sophisticated logging systems capable of transporting logs up to 1,500 feet.

Growth Function

In 1970, approximately 40% of the total annual growth was offset by mortality forest-wide. Insect and disease caused approximately 82 % of that mortality. (Bridger-Teton, June 8, 1979, page 4). In 1985, it was estimated approximately 70 % of the total annual growth was offset by mortality forest-wide. Some estimate almost all annual growth will be offset by mortality forest-wide.

Forest Vegetation

Lodgepole pine

In the analysis area, Lodgepole pine functions in both the dominant and persistent seral role. In the dominant seral role, Lodgepole pine occupies the site for 100 to 200 years. In these stands more shade tolerant species are present and will replace the lodgepole in the absence of disturbance such as fire or timber harvest. Without fire, dominant lodgepole pine stands have been succeeded by more shade tolerant associated species such as spruce-fir.

In the persistent seral role, lodgepole pine stands reflect vegetation characteristically present due to recurring disturbances. The habitat type of these stands usually reflects a more shade tolerant

species as its potential occupant. However, extreme density of lodgepole pine and light, recurrent surface fires, allow predominance of lodgepole pine

Mountain pine beetle and fire have historically played significant roles maintaining the lodgepole pine cover type. Through periodic beetle outbreaks followed by regeneration periods, two or more tree canopy layers have developed. As a result of beetle kill and individual tree harvest, mixed species canopies have developed. Both as individuals and/or in small groups to utilize the growing space created as a result of loss of lodgepole pine. Mountain Pine Beetle (MPB) has affected lodgepole pine stands in the analysis area. Most of these areas were harvested. In the areas not disturbed by fire or timber harvest, subalpine fir has regenerated and is utilizing the growing space created by lodgepole pine mortality. In areas where lodgepole pine has established, it has become infected with dwarf mistletoe.

Fire has created variation in tree diameter class by functioning both as lethal and non-lethal destruction agent. Most of the fires of the past were timber stand replacing. Areas where two distinct diameter classes are present are found along the edges of the past stand replacing fires.

Douglas-fir

Douglas-fir *(Pseudotsuga menziesii)* is located on sites within the analysis area which are generally warm and dry with occasional drought to sites that are cool and moist. It generally is present in pure stands on the steeper slopes and a mixture with other tree species on gentler slopes. It has a moderate tolerance to shade, being more tolerant as a seedling than when mature. Once established, it does best in full sun. It has pretty good resistance to fire if mature.

Engelmann spruce

Engelmann spruce, (*Picea engelmanni)* is located on cool, moist sites. Best germination has occurred on mineral soil and humus in 40-60% sunlight. Partial shading is essential. Seedling growth is slow. With its thin bark and persistent branches, it is susceptible to fire. It is easily windthrown, especially after partial cutting. In recent years, spruce beetle has caused problems in some areas.

Subalpine fir

Subalpine fir, *(Abies lasiocarpa)* is generally found in the analysis area on cool moist sites characterized by abundant moisture during the short growing season. It is one of the most shade tolerant trees in the area. These trees are generally less than 150 years old and often suffer from pathological diseases. It is very shade tolerant and does not compete well in full light. Areas of windthrow from root rot are common. In many areas fungi have weaken the tree making it susceptible to windthrow and other problems.

Limber pine

Limber pine *(Pinus flexilis)* generally occupies lower timberline sites or rocky sites. They are generally found on the driest sites capable of supporting conifers. These sites experience extensive summer drought. It is shade intolerant, but sites are often so dry that root competition prevents closed canopies. High elevation stands are extremely slow to regenerate, requiring several hundred

years to achieve pre-disturbed densities. They are susceptible to white pine blister rust and harbor dwarf mistletoe in some areas.

Where limber pine occurs in pure stands or composes the majority of the stocking, it is a long-lived, very shade intolerant, slow growing, small to medium sized tree, predominating only on windswept, dry environments on rocky gravels and coarse sands. The habitat overlap of limber pine with whitebark pine makes them difficult to distinguish. Limber pine cones are 3-10 inches long and shed off whole, while whitebark pine cones are about 2 ½ - 4 inches long and do not shed whole.

Aspen

Quaking aspen, *(Populus tremuloides)* is a hardwood with clonal genetic properties. It occupies moist sites. It occurs on fine textured soils. It is extremely shade intolerant. It can be characterized by well-developed fibrous, branching root systems of large lateral roots with abundant sinkers. Aspen cold-hardens well when dormant, but is not frost tolerant during the growing season. Suckers are especially damaged by frost. Aspen is not drought tolerant, but can often draw moisture from fairly deep in the profile when upper layers appear droughty. Aspen stems are relatively short-lived (200 years would be very old), but clones may be thousands of years old. Aspen generally reproduces from suckers. The number of suckers depends on the stored carbohydrates and site. It suckers best in full sun after destruction of the crown. Aspen is a prodigious seed producer, but little reproduction from seed is observed. Seedlings need continually moist mineral soil seedbeds. Aspen is easily killed by fire, but the stands do not burn well. Aspen suckers like crazy if burned. Burning is recognized as a good way to revitalize a stand. It is generally windfirm except for overmature stems with heart rot. Aspen has notorious problems with heart rot. It is generally considered to have a pathological rotation.

The Aspen forests are seral to conifer forests in the analysis area. Extensive stands are attributed to repeated wildfires or mechanical disturbance and in some instances, to excessive grazing. Aspen is an aggressive pioneer, dominating sites until replaced by more shade tolerant tree species. Aspen is considered a permanent (stable) type on some sites in the analysis area. Conifers have invaded the stands where conifer seed trees are available. In some instances, the uneven-aged characteristic in some aspen stands indicates a de facto climax.

Aspen Community Types are identified as stable, seral to conifers, and grazing disclimax (Muegeller 1988). The stable and grazing disclimax situations represent long-term persistent aspen stands. Seral stands have vigorous and abundant conifer reproduction in the tree canopy layer that constitutes more than 10% of the layer. The stable stands have little or no conifer reproduction, thus, less than 10% of the tree canopy is conifer. Stands of aspen seldom persist for more than 200 years. However, root systems, where most regeneration occurs, persist up to 8,000 years. Life span is controlled by site capability, elevation, and biological damaging agents. Aspen stands older than 100 years are usually affected by heart and butt rotting fungi, plus several species of cankers.

Stand Structure Classification (O'Hara et al, 1996)

Stand structure is a description of both the vertical and horizontal arrangement of large woody stems. The processes occurring within the stand define the following classifications. Ranges of

ages, as used in this analysis associated with the stand structure, comprises the best information available without exact direct measurements of stand age for each stand.

Stand Initiation occurs when growing space is reoccupied following a stand-replacing disturbance (insects and fire in coniferous host type are often the principle natural disturbances, or timber harvest), typically by seral species. It is described as having one canopy stratum (may be broken or continuous); may have one cohort seedlings or saplings (a cohort are the trees arising after a common disturbance either natural or artificial); grass, forbs and shrubs may also be present with early seral trees. In the analysis area there are approximately 16, 490 acres in this stage representing 8.2% of the forested area (about half from past harvest and half from wildfire). As used in this analysis for the Greys River drainage, stand initiation is composed of 0 to 40 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structures of "grass/forb" and "seedling/sapling" stages.

Stem Exclusion: Open Canopy exists when the occurrence of new tree stems is excluded due to moisture limitations. Tree crowns are open growing; tree canopy is broken. This can be maintained by frequent under burning or management. It is described as having one canopy stratum; one cohort; trees are excluding the establishment of new stems through competition; pole or small tree-sized; and an understory of shrubs, grasses, and forbs may be present. In the analysis area, there are 1,838 acres in this stage representing 0.9% of the forested area. As used in this analysis for the Greys River drainage, stem exclusion-open canopy is composed of 41 to 100 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structures of "young forest" stage.

Stem Exclusion: Closed Canopy exists when the occurrence of new trees is excluded due to moisture or light limitations; tree crowns are abrading and the tree canopy is closed. It is described as having a continuous closed tree canopy; has one or more canopy strata; consists of one cohort. If there is a lower strata present, they are the same age as the upper strata; consist of poles, or medium sized trees; shrubs, grasses, and forbs may be present. In the analysis area there are approximately 867 acres in this stage representing 0.4% of the forested area. As used in this analysis for the Greys River drainage, stem exclusion-closed canopy is composed of trees 41 to 100 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structure of "young forest" stage.

Understory Reinitiation occurs when a second cohort is established under an older, typically seral overstory. Mortality in the overstory or partial overstory removal creates growing space for new trees in the understory. It is described by having a broken overstory canopy; two or more tree canopy strata; two cohorts are recognizable; the overstory is pole, small, or medium-sized trees; the understory consists of seedlings, saplings, or poles. In the analysis area there are approximately 1,770 acres in this stage representing 0.9% of the forested area. As used in this analysis for the Greys River drainage, understory reinitiation is composed of trees greater than 101 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structures of "mid-aged forest", "mature forest" and "old forest" stages.

Young Forest: Multi Strata exists when several cohorts have been established under the influence of management, or through fires with mixed lethal and non-lethal effects, or by insect and disease group killing; seral overstory trees are generally absent due to harvesting or other disturbance. It is described by a broken overstory tree canopy; has more than two canopy strata; has more than two cohorts; large trees are absent in the overstory; the stand is characterized by diverse horizontal and vertical distributions of trees and tree sizes; seedlings, saplings, poles, small and medium sized trees are present. In the analysis area there are approximately 4,788 acres in this stage representing 2.4% of the forested area. As used in this analysis for the Greys River drainage, young forest multi strata is composed of trees 41 to 100 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structure of "young forest" stage.

Old Forest: Multi Strata is found where there are multiple stratum stands of large, old trees. There are multiple cohorts present. It is described as having a broken overstory tree canopy; more than 2 canopy strata; more than two cohorts; large trees dominate in the overstory; stand is characterized by diverse horizontal and vertical distributions of trees and tree sizes; all tree sizes may be present. In the analysis area there are approximately 95,664 acres in this stage representing 47.6% of the forested area. As used in this analysis for the Greys River drainage, old forest multi strata is composed of trees greater than 101 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structures of "mid-aged", "mature forest" and "old forest" stages.

Old Forest: Single Strata is found where there is a single stratum stand of large, old trees. No or few young trees are in the understory. There are park-like conditions resulting from non-lethal natural fires, prescribed underburning or other management. It is described as having a broken or continuous canopy of large, old trees, one stratum, may be a single cohort; large trees dominate the overstory; the understory is absent of seedlings or saplings; grass, forbs and shrubs may be present in the understory. In the analysis area there are approximately 79,536 acres in this stage representing 39.6% of the forested area. As used in this analysis for the Greys River drainage, old forest single strata is composed of trees greater than 101 years of age and includes the Bridger-Teton's Properly Functioning Condition stand structures of "mid-aged", "mature forest" and "old forest" stages.

SUMMARY– Composition, Stand Structure
Vegetation can be described by the dominant cover type and Stand Structure.

There are approximately 74,074 to 76,060 forested acres within DFC 1B (approximately 35% of the forested area). There are approximately 39,019 to 39,637 forested acres within DFC 10 (approximately 19% of the forested area). There are approximately 95,996 to 98,514 forested acres within all other DFC's (approximately 46% of the forested area). The analysis areas occur in a total of 241 timber compartments.

Old Growth
Qualified District and Forest Wildlife Biologists alongside Wyoming State Game and Fish Biologists delineated old growth stands during the Forest Planning process in 1981. Designated old growth stands on the Bridger Teton are defined as: a minimum of 200 contiguous acres in size; 70 to 100% crown density; subalpine fir, Engelmann spruce or Douglas-fir stands; generally spaced

one to two miles apart, but attached by stringers of forested riparian areas or mature timber (Forest Plan page 129).

Designations were based on District Habitat Units and Diversity units. These units generally followed watershed boundaries. One or more Diversity Units made up the Habitat Unit. One "Minimum Level' old growth stand was established within each Diversity Unit based on optimum juxtaposition "Objective Level" old growth stands were designated as being needed in addition to "Minimum Level", but their juxtaposition is not as critical as the "Minimum Level" old growth.

Old growth is not an issue as most of the vegetation is old. Characteristics of Old Growth Forests in the Intermountain Region, published in April 1993, further defines old growth. Ecological characteristics of old growth were defined by Society of American Foresters cover types. These are draft descriptions.

Properly Functioning Condition

A desired state of forest health is a condition where biotic and abiotic influences on the forest (i.e. insects, diseases, fire, atmospheric deposition, silvicultural treatments) do not threaten management objectives for a given Forest or analysis area (USDA Forest Service 1993). A forest in good health is a fully functioning community of plants and animals and their physical environment (Monning & Byler 1992). In the broadest sense, a healthy forest is a description of a productive, resilient and diverse forest ecosystem: a forest with a future (Wilson 1991).

Fire exclusion, grazing and silvicultural treatments have combined with environmental and ecosystem successional changes to create overly dense stands, an imbalance in the variety of stand ages and an altered mix of plant and animal species. This condition, largely the unintended outcome of past management coupled with ecosystem response and weather cycles, has resulted in a more homogenous forest. In this process of ecosystem change, landscape diversity has been reduced, hydrologic, carbon, and nutrient cycles have been altered, and both distribution of species and biological diversity have been affected (Clark & Sampson 1995).

A healthy forest is one that maintains the function, diversity, and resiliency of all its components, such as wildlife populations, fish habitat, riparian areas, soils, rangelands and economic potential. Maintaining a healthy forest will require active management. Road maintenance, road obliteration, use of prescribed fire, grazing management, thinning of green trees, salvage, reducing exotic pests, and restoring stream-side functions are some Forest Service priorities for restoring forest health (USDA Forest Service 1993).

The elimination of fire from fire-dependent ecosystems has increased the risk of catastrophic wildfires, and increased the severity of drought, insect infestation, and disease. Forest health principles include recognizing that unhealthy conditions developed over many decades and it will take time to correct them.

Lodgepole pine - PFC

The Greys River Lodgepole Pine vegetation falls outside the range of properly functioning condition. A balanced range of structure classes does not exist. Older age classes of trees dominate

the area. Approximately 69.1% of the Lodgepole pine is greater than 101 years of age. It is difficult to ascertain the acreages greater than 150 years of age. Using the average forest age for Lodgepole as 136 years old[3], 50% of the lodgepole pine acres (62,684 acres) are greater than 136 years old and 50% of the Lodgepole pine acres are less than 136 years old. Mathematical extrapolation (based on 312 years as the oldest tree) is not a sound method to determine the area greater than 150 years of age. Approximately 13,774 acres, or 31.8% of the Lodgepole pine greater than 101 years of age has a multi-structure canopy.

Using 62,684 acres as the Lodgepole Pine subject area, the balanced range of structure would include:
Approximately 10% in grass/forb stage (6,268 acres).
Approximately 10% in seedling/sapling stage (6,268 acres).
Approximately 20% in young forest (12,537 acres).
Approximately 20% in mid aged forest (12,537 acres).
Approximately 20% in mature forest (12,537 acres).
Approximately 20% in old forest (12,537 acres).

To meet the Properly Function Condition criteria, the timber stand structural classes must be diverse or balanced for sustainability or recovery. This includes a maximum of 60% of the tree types being in mature or old ages classes (>150 years old) and nearly all stands are even aged. A balanced age class distribution would contain approximately: 10% grass/forb; 10% seedling/sapling; 20% young-forest; 20% mid-aged forest; 20% mature forest; 20% old-forest.

For lodgepole pine, approximately 68.0% of the forested area is in mature and old age class (>100 years) represented by 21.4% Old Forest Multi-Strata and 46.6% Old Forest Single-Strata stand structure. About 13.2% is in grass/forb and seedling/sapling stage represented by Stand Initiation stand structure. Approximately 18.5% is young and mid aged forests represented by 0.6% Stem Exclusion Open, 11.8% Stem Exclusion Closed, and 0.5%Understory Reinitiation.

The Bridger-Teton's landscape description of Historic Range of Variation criteria states, "Minimum of 60% of the trees is lodgepole pine." "Recruitment of other conifers occurring at natural rates, based on Potential Natural Vegetation type and site potential." "Succession from lodgepole pine to other cover types is balanced by conversion of other types to lodgepole through natural and human disturbances." Lodgepole pine cover type represents only 30.3% of the total forested area.

For timber stands to be in Properly Functioning Conditions insects and diseases populations must be at endemic levels with periodic outbreaks. Dwarf Mistletoe is currently at endemic levels throughout the drainage. Occurrence of Mountain Pine Beetle is present. Outbreaks of Western

[3] The 1985 average age for Lodgepole pine was 121 years of age. Fifteen years have been added to that age.

Balsam Bark Beetle are occurring in most sub-drainages. Outbreaks of Mountain Pine Beetle were extensive in lodgepole pine timber stands during the 1960's and late 1970's. [4]

The Properly Functioning Conditions criteria states that fire regimes are within historical ranges. Fire regimes within the analysis area are outside the range of Properly Functioning Conditions. This was evident in the Blind Trail Wildfire which burned 9,831 acres, the Corral Creek Wildfire which burned 4,380 acres and the Aspen Hollow Wildfire which burned 3046 acres. Much of the burned over area will take many years to have conifer trees reestablished. Bridger-Teton landscape description of Historic Range of Natural Variation criteria state "Insect and disease create fuel concentrations which eventually burn". "Timber stand replacing fire occurs every 100 to 300 years, resetting stand development and succession." "The influence of insects and disease on the fire regime increases as elevation and moisture increase." Although there can be significant biotic disturbance at higher elevations, these sites are generally moist with a narrow window for fire. Bark beetle outbreaks may leave abundant down fuels. However, stand replacing fires are infrequent on these high elevation/moist site conditions.

Fires have been effectively suppressed as part of management over the last 40 years in the Greys River Drainage. During the 1960's and 70's Mountain Pine Beetle created many dead trees and created dead and down fuels. Timber harvest treated these fuel concentrations that normally would have burned.

Properly Functioning Condition criteria states other disturbance regimes are within historical ranges. Other disturbance regimes include herbivory, floods and wind. These are within the range of Properly Functioning Conditions.

To be properly functioning timber stand patterns must be within historic ranges. A mosaic of size and age classes occurs across the landscape, but nearly all timber stands are even aged. Endemic insects and disease may create some uneven aged timber stands through death and replacement of individual trees. The role of fire is to maintain the presence of lodgepole pine stands.

Within the analysis area, landscape patterns of distribution, connectivity, patch size and patch shape reflect fire and timber harvest patterns. Endemic and epidemic insect and disease activity have converted acres of Old Forest Single-Strata to acres of Old Forest Multi-Strata stand structure as lodgepole overstory composition was reduced and replaced by shade tolerant species. It became Old Forest Multi-Strata as a consequence of the mountain pine beetle outbreaks. Mortality of lodgepole pine created growing space and conditions for a new cohort of regeneration of individuals and small groups. This contributes to uneven age class distribution. Past clearcutting created 1,436 acres of even aged class distribution. Past selection harvest methods created

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[4] *Endemic*:Endemic population levels are generally regarded as having no effect on the complexation of the biotic community in which they occur (Graham 1963).
Epidemic: At times, some insect populations expand to a level causing sudden disturbances of the normal relationships in the forest association. Groups of trees or whole stands are conspicuously damaged or killed within the span of a few weeks. This condition of population constitutes an outbreak or epidemic (Graham 1963).

approximately 336 acres of uneven aged class distribution represented by establishment of young trees in the understory.

Douglas-fir - PFC

The Greys River Douglas-fir vegetation falls outside the range of properly functioning condition. A balanced range of structure classes does not exist. Older age classes of trees dominate the area. Approximately 89.6% of the Douglas-fir is greater than 100 years of age. It is difficult to ascertain the acreages greater than 250 years of age. Using the average forest age for Douglas-fir as 176 years old[5], 50% of the Douglas-fir acres (62,724 acres) are greater than 176 years old and 50% of the Douglas-fir acres are less than 176 years old. Mathematical extrapolation (based on 469 years as the oldest tree) is not a sound method to determine the area greater than 250 years of age. Approximately 28,983 acres or 51.6% of the Douglas-fir greater than 101 years of age has a multi-structure canopy.

Using 62,724 acres as the Douglas-fir subject area, the balanced range of structure would include:
Approximately 10% in grass/forb stage (6,272 acres).
Approximately 10% in seedling/sapling stage (6,272 acres).
Approximately 20% in young forest (12,545 acres).
Approximately 20% in mid aged forest (12,545 acres).
Approximately 20% in mature forest (12,545 acres).
Approximately 20% in old forest (12,545 acres).

For the Douglas-fir timber stands to be in Properly Functioning Condition, insect and disease populations remain at endemic levels with occasional outbreaks. Nonlethal mixed severity surface fires occur every 40 to 100 years. Stand-replacing fires occur at intervals of 200 years or more. Role of fire is to maintain Douglas-fir where it is a seral species. Conversion of stands to and from this type is balance across the landscape. Douglas-fir dominates mixed species stands. Subalpine fir makes up less than 25% of the overstory. Succession of Douglas-fir to subalpine fir is balanced by conversion of subalpine fir to Douglas-fir through natural or human disturbance. Conversion of Douglas-fir to lodgepole pine or aspen cover types through disturbance is balanced by succession from lodgepole or aspen to Douglas-fir.

The timber stands are not in Properly Functioning Conditions as evident by the continuing out break of Douglas-fir Bark Beetle and the need for preventative action to protect high value tree in campgrounds.

Lack of the timber stands being in properly Functioning Condition is evident in several large wildfires in the drainage. The fires were lethal to large acreages of Douglas-fir trees and there is no evidence of these areas being regenerated to Douglas-fir any time soon. Insect and fire activity along with the succession of Douglas-fir to subalpine fir is resulting in a net loss of the Douglas-fir acreage.

Engelmann Spruce - PFC

The Greys River Engelmann Spruce vegetation falls outside the range of Properly Functioning Condition. A balanced range of structure classes does not exist. Older age classes of trees dominate

[5] The 1985 average age for Douglas-fir as 161 years of age. Fifteen years have been added to that age.

the area. Approximately 93.5% of the Engelmann Spruce is greater than 100 years of age. It is difficult to ascertain the acreages greater than 200 years of age. Using the average forest age for Engelmann Spruce as 182 years old[6], 50% of the Engelmann Spruce acres (27,872 acres) are greater than 182 years old and 50% of the Engelmann spruce acres are less than 182 years old. Mathematical extrapolation (based on 440 years as the oldest tree) is not a sound method to determine the area greater than 200 years of age. Approximately 21,180 acres or 81.2% of the Engelmann Spruce greater than 101 years of age has a multi-structure canopy.

Using 27,789 acres as the Engelmann Spruce subject area, the balanced range of structure would include:
Approximately 10% being in the grass/forb stage (2,779 acres).
Approximately 10% being in seedling/sapling stage (2,779 acres).
Approximately 20% being in the young forest (5,557 acres).
Approximately 20% being in the mid aged forest (5,557 acres).
Approximately 20% being in mature forest (5,557 acres).
Approximately 20% in old forest (5,557 acres).

Existing conditions include approximately 1,665 acres Engelmann spruce in stand initiation stand structure that include the grass/forb and seedling/sapling category. Existing conditions for Engelmann Spruce include approximately 6 acres in young forest (41-100 years old). Using Properly Functioning Condition requirements, approximately 5,557 acres should be in young forest. Therefore a goal to convert approximately 5,551 (5,557 minus 6 acres) to young forest structure would be necessary to become properly functioning. As it is difficult to create 40 year old trees from trees older than 101 years old, growth will have to occur from existing stand initiation structure to grow into young forest, mid aged, mature and old forest stand structure. Approximately 1,665 acres will become young forest over the next 40-year period of time.

Subalpine fir - PFC

The Greys River subalpine fir vegetation falls outside the range of Properly Functioning Condition. A balanced range of structure classes does not exist. The area is dominated by older age classes of trees. Approximately 90% of the subalpine fir is greater than 100 years of age. It is difficult to ascertain the acreages greater than 200 years of age. Using the average forest age for subalpine fir as 119 years old[7], 50% of the subalpine fir acres (24,052 acres) are greater than 119 years old and 50% of the subalpine fir acres are less than 119 years old. Mathematical extrapolation (based on 240 years as the oldest tree) is not a sound method to determine the area greater than 200 years of age. Approximately 18,685 acres or 85% of the subalpine fir are greater than 101 years of age and have a multi-structure canopy.

Using 24,052 acres as the subalpine fir subject area, the balanced range of structure would include:
Approximately 10% in grass/forb stage (2,406 acres).
Approximately 10% in seedling/sapling stage (2,406 acres).
Approximately 20% in young forest (4,810 acres).

[6] The 1985 average age for Engelmann Spruce as 167 years of age. Fifteen years have been added to that age.
[7] The 1985 average age for subalpine fir as 104 years of age. Fifteen years have been added to that age.

Approximately 20% in mid aged forest (4,810 acres).
Approximately 20% in mature forest (4,810 acres).
Approximately 20% in old forest (4,810 acres).

Existing conditions include approximately 1,714 acres of subalpine fir in stand initiation stand structure that include the grass/forb and seedling/sapling category. Using Properly Functioning Conditions direction, approximately 4,812 acres should be in stand initiation classification. Therefore, a goal to convert approximately 3,098 acres of old forest structure (4,812 minus 1,714 acres) to stand initiation structure would be necessary to be in Properly Functioning Condition. In addition, approximately 25% of the stand initiation acres should be created each decade (25% of the 0-40 year old age class). Therefore, approximately 1,202 acres of stand initiation should be created every 10 years.

Existing conditions for subalpine fir include approximately 506 acres in young forest (41-100 years old). Using Properly Functioning Condition requirements, approximately 4,810 acres should be in young forest. Therefore, a goal to convert approximately 4,304 (4,810 minus 506 acres) to young forest structure would be necessary to become properly functioning. As it is difficult to create 40 year old trees from trees older than 101 years old, growth will have to occur from existing stand initiation structure to grow into young forest, mid aged, mature and old forest stand structure. Approximately 1,714 acres will become young forest over the next 40-year period of time.

Whitebark & Limber pine - PFC

Although separate and distinct Properly Functioning Conditions exist for both species, acres of whitebark pine and limber pine were lumped together.

The Greys River Whitebark-Limber pine vegetation falls outside the range of Properly Functioning Condition. A balanced range of structure classes does not exist. Older age classes of trees dominate the area. Approximately 96% of the whitebark-limber pine is greater than 100 years of age. It is difficult to ascertain the acreages greater than 200 years of age. Using the average forest age for Whitebark-Limber Pine as 189 years old[8], 50% of the Whitebark-Limber Pine acres (20,714 acres) are greater than 189 years old and 50% of the Whitebark-Limber Pine acres are less than 189 years old. Mathematical extrapolation (based on 350 years as the oldest tree) is not a sound method to determine the area greater than 200 years of age.

Using 20,714 acres as the Whitebark-Limber Pine subject area, the balanced range of structure would include:
Approximately 10% in grass/forb stage (2,072 acres).
Approximately 15% in seedling/sapling stage (3,107 acres).
Approximately 15% in young and mid aged (3,107).
Approximately 30% in mature forest (6,214 acres).
Approximately 30% in old forest (6,214 acres).

[8] The 1985 average age for Whitebark pine was 174 years of age. Fifteen years have been added to that age.

Aspen - PFC

The Greys River Aspen vegetation falls outside the range of Properly Functioning Condition. A balanced range of structure classes does not exist. Older age classes of trees dominate the area. Approximately 97% of the aspen is greater than 101 years of age. Using the average forest age for Aspen as 86 years old[9], 50% of the Aspen acres (8,832 acres) are greater than 186 years old and 50% of the Aspen acres are less than 86 years old.

Using 8,832 acres as the Aspen subject area, the balanced range of structure would include:
Approximately 40% in grass/forb and seedling/sapling stage (3,532 acres).
Approximately 30% in young, mid, and mature forest (2,650 acres).
Approximately 30% in old forest (2,650 acres).
Existing conditions include approximately 240 acres in stand initiation stand structure that include the grass/forb and seedling/sapling category.

Forested characteristics for each HUC

Outline of information displayed by 6th Order Hydrologic Unit Code (HUC)
HUC Name and Total Forested Acres by timber compartments[10].
Graph - Species Composition by Forest Plan DFC in Acres.
Pie Charts[11] - % Stand Structure (7 classes) for each HUC.
Pie-Charts - % Age Classes (3 classes) by HUC.
Description of Compartments within HUC
Description of "Inventoried Road-less Areas" by HUC.
Display of acres by species needing treatment to become Properly Functioning.

[9] The 1985 average age for Whitebark pine was 174 years of age. Fifteen years have been added to that age.
[10] Compartment boundaries are not a perfect fit to HUC boundaries. Some compartments are located in more than one HUC. For simplification,each compartment was lassigned into one HUC. No compartments were split.
[11] Pie Charts are read with the cooresponding first feature in the legend beginning at the 12 o'clock position. The second feature in the legend would be the second feature appearing after the 12 o'clock position, and so on and so forth.

Table 2.11
Existing Acres of Douglas fir by-Stand Structure by Age by HUC in Descending Order

HUC Name	0-40 Years. Stand Initia-tion	41-100 Years. Stem Exclusion Open	41-100 Years. Stem Exclusion Closed	101+ Years. Under-story Reinitia-tion	41-100 Years. Young Forest Multi-Strata	101+ Years. Old Forest Multi-Strata	101+ Years. Old Forest Single Strata	Total Acre	Ranking Opportunity for Treatment.12
Lower Little Greys River	2,296	0	329	0	0	5,420	2,573	10,618	1
Greys River-Squaw Creek	152	588	270	505	190	5,899	2,810	10,414	2
Greys River-White Creek	394	44	373	75	0	5,368	4010	10,264	3
Greys River-Bear Creek	344	0	0	0	0	1,809	4,879	7,032	4
Greys River-Deadman	0	0	0	0	33	3,093	2,183	5,309	5
North Fork Sheep Creek	88	34	0	0	89	312	4,637	5,160	6
Greys River-Corral Creek	894	0	0	0	48	1,840	1,384	4,166	7
Upper Little Greys River	0	0	125	0	0	1,566	2,098	3,789	8
Murphy Crk	0	0	102	0	31	2,205	983	3,321	9
Greys River-Blind Bull	122	0	0	0	0	570	1,586	2,278	10
Greys River-Spring Creek	0	0	0	0	0	321	53	374	11
Total Acres	4,290	666	1,199	580	391	28,403	27,196	62,725	

The Douglas-fir subject area comprises the greatest number of acres (approximately 62,725 acres) of any species in the Greys River Landscape. According to 1970 Forest-wide inventory, there were approximately 0 acres of commercial forest lands between 0 and 20 years of age and approximately 3,810 acres of commercial forest lands between 21 and 40 years of age. Today, approximately 4,290 acres are in stand initiation structure stage (0-40 years old) in the Greys River Landscape. Properly Functioning Condition for the Douglas-fir subject area in the Greys River Landscape Assessment prescribes approximately 12,545 acres of stand initiation. To be properly functioning, there is a need to create approximately 8,255 acres of stand initiation for today's point in time (year 2000). Over the next and each following decade, approximately 3,136 acres of stand initiation should be created to maintain and sustain the population of Douglas-fir. Forest Restoration efforts should include the use of: timber sales as a tool to create new age classes in Forest Plan Desired Future Conditions 1B, 3, 4, 9A and 10 management area prescriptions; prescribed fire as a tool to create new age classes in Forest Plan Desired Future Conditions 2A and 12, management area prescriptions in areas where timber harvest is impracticable; and a combination of timber sales and prescribed fire where it is ecologically feasible and makes sense to combine the tools to create new ages of the species.

[12] Ranking Opportunity is based on total acres of Old Forest Single-Strata and Old Forest Multi-Strata available for conversion to younger age classes. It does not reflect other factors such as age class balance or stand structure balance.

Table 2.12
Existing Acres of Engelmann Spruce by-Stand Structure by Age by HUC, Descending order

HUC Name	0-40 Years. Stand Initia-tion	41-100 Years. Stem Exclusion Open	41-100 Years. Stem Exclusion Closed	101+ Yea Under-sto Reinitia-tion	41-100 Years. Young Forest Multi-Strata	101+ Years. Old For Multi-Strata	101+ Years. Old For Single Strata	Total Acres	Ranking Oppor-tunity for Treat-ment.13
Greys River-Bear Creek	195	0	0	125	0	3,191	1,207	4,718	1
Greys River-White Creek	0	0	0	0	0	3,809	695	4,504	2
Murphy Crk	0	0	0	206	0	3,579	157	3,942	3
Greys River-Corral Creek	0	0	0	0	0	2,690	1,207	3,897	4
Greys River-Squaw Creek	363	0	6	89	0	2,203	208	2,869	5
Greys River-Spring Creek	13	0	0	0	44	1,689	642	2,388	6
Greys River-Blind Bull Crk	407	0	0	0	0	1,595	35	2,037	7
Lower Little Greys River	588	0	0	0	0	280	213	1,081	8
Upper Little Greys River	0	0	0	0	0	805	73	878	9
Greys River-Deadman Crk	99	0	0	0	0	642	13	754	10
North Fork Sheep Creek	0	0	0	0	0	278	443	721	11
Total Acres	1,665	0	6	420	44	20,761	4,893	27,789	

The Engelmann Spruce subject area comprises the third most number of acres (approximately 27,789 acres) of any species in the Greys River Landscape. Today, approximately 1,665 acres are in stand initiation structure stage (0-40 years old) in the Greys River Landscape. Properly Functioning Condition for the Engelmann Spruce subject area in the Greys Rive Landscape Assessment prescribe approximately 5,558 acres of stand initiation. To be properly functioning, there is a need to create approximately 3,893 acres of stand initiation for today's point in time (year 2000). Over the next and each following decade, approximately 1,390 acres of stand initiation should be created to maintain and sustain the population of Engelmann Spruce.

[13] Ranking Opportunity is based on total acres of Old Forest Single-Strata and Old Forest Multi-Strata available for conversion to younger age classes. It does not reflect other factors such as age class balance or stand structure balance.

Table 2.13
Existing Acres of Subalpine fir by Stand Structure by Age by HUC, Descending Order

HUC Name	0-40 Years Stand Initia-tion	41-100 Years. Stem Exclusion Open	41-100 Years. Stem Exclusion Closed	101+ Years. Under-story Reinitia-tion	41-100 Years. Young Forest Multi-Strata	101+ Years. Old Forest Multi-Strata	101+ Years. Old Forest Single Strata	Total Acres	Ranking Opportunity for Treatment. [14]
Greys River-Deadman Crk	30	0	0	84	18	4,275	505	4,912	1
Greys River-Spring Creek	50	37	0	169	242	3,329	477	4,304	2
Greys River-Bear Creek	521	0	0	0	0	1,812	432	2,765	3
Greys River-Corral Creek	561	0	0	52	133	1,614	283	2,643	4
Upper Little Greys River	0	0	0	0	0	2,058	206	2,264	5
Lower Little Greys River	484	0	0	0	42	1,157	113	1,796	6
North Fork Sheep Creek	0	0	0	0	0	806	575	1,381	7
Grays River-White Creek	0	0	0	0	0	1,148	116	1,264	8
Greys River-Squaw Creek	68	0	0	27	0	1,037	0	1,132	9
Murphy Creek	0	0	0	0	34	748	46	828	10
Greys River-Blind Bull Crk	0	0	0	0	0	701	62	763	11
Total Acres	1,714	37	0	332	469	18,685	2,815	24,052	

The Subalpine fir subject area comprises the fourth largest number of acres (approximately 24,052 acres) of all species in the Greys River Landscape. Today, approximately 1,714 acres are in stand initiation structure stage (0-40 years old) in the Greys River Landscape. Properly Functioning Condition for the subalpine fir subject area in the Greys River Landscape Assessment prescribes approximately 4,812 acres of stand initiation. To be properly functioning, there is a need to create approximately 3,098 acres of stand initiation for today's point in time (year 2000). Over the next and each following decade, approximately 1,203 acres of stand initiation should be created to maintain and sustain the population of subalpine fir. Subalpine fir is the climax species. In the absence of disturbance, many acres will convert to subalpine fir. These acres are comprised of heavy fuel loads and subject to catastrophic fire. These acres are unstable, not sustainable, and not considered as managed age classes of stand initiation (it is Understory Reinitiation). Forest Restoration efforts should include the use of: timber sales as a tool to create new age classes in Forest Plan Desired Future Conditions 1B, 3, 4, 9A and 10. Prescribed fire should be used as a tool to create new age classes in Forest Plan Desired Future Conditions 2A and 12 areas where timber harvest is impracticable. A combination of timber sales and prescribed fire should be used where it is ecologically feasible and makes sense to combine the tools to create new age classes of the species.

Table 2.14

[14] Ranking Opportunity is based on total acres of Old Forest Single-Strata and Old Forest Multi-Strata available for conversion to younger age classes. It does not reflect other factors such as age class balance or stand structure balance.

Existing Acres of Whitebark & Limber Pine by Stand Structure by Age by HUC, Descending Order

HUC Name	0-40 Years. Stand Initiation	41-100 Years. Stem Exclusion Open	41-100 Years. Stem Exclusion Closed	101+ Years. Understory Reinitiation	41-100 Years. Young Forest Multi-Strata	101+ Years. Old Forest Multi-Strata	101+ Years. Old Forest Single Strata	Total Acres	Ranking Opportunity for Treatment.15
Greys River-Corral Creek	150	674	0	0	0	3,165	623	4,612	1
Greys River-Spring Creek	0	16	0	0	0	2,668	737	3,421	2
Greys River-Bear Creek	0	0	0	0	0	655	2,712	3,367	3
Upper Little Greys River	0	0	0	0	0	999	2,139	3,1-38	4
Murphy Crk	0	0	0	0	0	72	1,464	1,536	5
Greys River-White Creek	0	0	0	0	0	247	1,031	1,278	6
North Fork Sheep Creek	0	0	0	0	0	169	828	997	7
Greys River-Deadman	0	0	0	0	0	220	726	946	8
Lower Little Greys River	0	0	0	0	0	685	0	685	9
Greys River-Squaw Creek	0	0	0	0	0	421	159	580	10
Greys River-Blind Bull Creek	0	0	0	0	0	154	0	154	11
Total Acres	150	690	0	0	0	9,455	10,419	20,714	

The Whitebark-Limber Pine subject area comprises the 5th largest number of acres (approximately 20,714 acres) of species in the Greys River Landscape. Today, approximately 150 acres are in stand initiation structure stage (0-40 years old) in the Greys River Landscape. Properly Functioning Condition for the Whitebark-Limber Pine subject area in the Greys River Landscape Assessment prescribes approximately 3,107 acres of stand initiation. To be properly functioning, there is a need to create approximately 2,957 acres of stand initiation for today's point in time (year 2000). Over the next and each following decade, approximately 777 acres of stand initiation should be created to maintain and sustain the population of Whitebark-Limber Pine. Very little management has occurred for this species. In the past, management was lumped with lodgepole. The species Process and Functions are different from lodgepole. Management should therefore be separated from lodgepole pine. The majority of trees in these species is found at high elevations with no road access. Immediate Forest Restoration efforts should include the use of: timber sales as a tool to create new age classes in Forest Plan Desired Future Conditions 1B, 3, 4, 9A and 10. Prescribed fire should be used as a tool to create new age classes in Forest Plan Desired Future Conditions 2A and 12 areas where timber harvest is impracticable. A combination of timber sales and prescribed fire should be used where it is ecologically feasible and makes sense to combine the tools to create a new age class of the species.

[15] Ranking Opportunity is based on total acres of Old Forest Single-Strata and Old Forest Multi-Strata available for conversion to younger age classes. It does not reflect other factors such as age class balance or stand structure balance.

Table 2.15 Existing Acres of Aspen by-Stand Structure by Age by HUC in Descending Order

HUC Name	0-40 Years. Stand Initia-tion	41-100 Years. Stem Exclusion Open	41-100 Years. Stem Exclusion Closed	101+ Years. Under-story Reinitia-tion	41-100 Years. Young Forest Multi-Strata	101+ Years. Old Forest Multi-Strata	101+ Years. Old Forest Single Strata	Total Acres	Ranking Oppor-tunity for Treat-ment.16
Greys River-Deadman Crk	0	0	0	0	0	0	1,923	1,923	1
Greys River-Bear Creek	0	0	0	0	0	266	1,080	1,346	2
Murphy Crk	0	0	0	0	0	1,140	39	1,179	3
Lower Little Gre River	217	0	0	0	0	763	28	1,008	4
Greys River-Blind Bull Crk	0	0	0	0	0	278	664	942	5
Greys River-Corral Creek	0	0	0	0	0	549	210	759	6
Greys River-White Creek	23	0	0	0	0	453	232	708	7
Upper Little Greys River	0	0	0	0	0	352	96	448	8
Greys River-Squaw Creek	0	0	0	0	0	277	0	277	9
Greys River-Spring Creek	217	0	0	0	0	184	58	242	10
North Fork Sheep Creek	0	0	0	0	0	0	0	0	11
Total Acres	457	0	0	0	0	4,263	4,329	8,832	

The Aspen subject area comprises the 6th greatest number of acres (approximately 8,832 acres) in the Greys River Landscape. Today, approximately 240 acres are in stand initiation structure stage (0-40 years old) in the Greys River Landscape. This species has recently been managed using prescribed fire activity resulting in the creation of new age classes. Properly Functioning Condition for the Aspen subject area in the Greys River Landscape Assessment prescribes approximately 3,532 acres of stand initiation. To be properly functioning, there is a need to create approximately 3,292 acres of stand initiation for today's point in time (year 2000). Over the next and each following decade, approximately 883 acres of stand initiation should be created to maintain and sustain the population of Aspen. Aspen is present in many conifer-dominated stands. Aspen clones should be managed and sustained by stimulating suckering where the species is encountered. Forest Restoration efforts should include the use of: timber sales as a tool to create new age classes in Forest Plan Desired Future Conditions 1B, 3, 4, 9A and 10. Prescribed fire should be used as a tool to create new age classes in Forest Plan Desired Future Conditions 2A and 12 areas where timber harvest is impracticable. A combination of timber sales and prescribed fire should be used where it is ecologically feasible and makes sense to combine the tools to create a new age of the species.

Every HUC is outside "Properly Functioning Condition." Opportunities exist in every HUC to create new age classes of "Stand Initiation" stand structure. Acreages of each species were weighted across the entire Greys River watershed. Then the acreages by species that need treatment today and over the next 10 years were spread

[16] Ranking Opportunity is based on total acres of Old Forest Single-Strata and Old Forest Multi-Strata available for conversion to younger age classes. It does not reflect other factors such as age class balance or stand structure balance.

out across each HUC by weighted arithmetic averages. Realizing that stand initiation cannot be instantly created, the acres needed today and over the next decade, were added together to obtain the number of acres to treat over the first decade (2000 to 2010). This is the treatment goal to become Properly Functioning.

Lodgepole Pine = treat 4,260 acres now + 3,134 acres over the next decade = 7,394 acres to treat.
Douglas-fir = treat 8,255 acres now + 3,136 over the next decade = 11,391 acres of treatment.
Engelmann Spruce = treat 3,893 acres now + 1,390 acres over the next decade = 5,283 acres to treat.
Subalpine fir = treat 3,098 acres now + 1,203 acres over the next decade = 4,301 acres to treat.
Whitebark-Limber = treat 2,957 acres now + 777 acres over the next decade = 3,734 acres to treat.
Aspen = treat 3,292 acres now + 883 acres over the next decade = 4,175 acres to treat.

Note: These numbers are the best that can be humanly derived. They are approximate averages. To reach this point, a minimum of 9,713,264 numbers were calculated. Detailed and specific "Location and Site" data (with associated maps) is available to analyze for the plan implementation stage of the NEPA process. This information will aid in exact location of projects and will aid in selection of methods to achieve the desired outcomes. This data and maps are located in the Bridger-Teton National Forests FS VEG data base.

Timber Management
Timber harvest has been a major component of resource management in the drainage. Since the initial reconnaissance and cruising of the timber resource in 1915, timber harvest has been the impetus behind most of the road building and development in the drainage. An inventory was completed using aerial photos, old harvest records, and dot counting acreages at the 7 1/2' quadrangle scale. It indicates that approximately 10,842 acres of timber have been harvested in the drainage. Of this, 3,768 acres have regenerated to the point they meet the Created Opening Duration Standard in the Forest Plan, and are now considered as "closed openings," 5,339 acres remain as "open openings," and 1,735 acres were selection cuts.

Understory Vegetation Communities
Understory vegetation in the Greys River analysis area is quite varied. The prominent understory community types have been grouped as: alpine tundra, mountain mahogany, mountain shrub, big sagebrush, tall forb, grassland/meadow and riparian/wetland (BTNF 1997).

Alpine Tundra

Alpine tundra communities occur in small pockets above timberline in the Salt River and Wyoming Ranges. These communities are characterized by herbs and dwarf shrubs. Most of these areas have fragile, highly erodible soils and may have dense vegetation or be almost entirely barren rock. Plant species and community diversity is controlled by heavy winds, cold summer & winter temperatures and intense ultraviolet radiation. Vegetation structure rarely exceeds four inches in height with occasional low-growing shrubs two to three feet in height. Large woody debris is scarce.

Due to lack of commodity interest in these areas, research and subsequent knowledge of alpine communities is limited. Domestic and wildlife grazing, along with recreation, influence the amount of bare ground and plant density in these areas. Soil erosion is the primary management concern. However, Forest-wide and within the capabilities of the areas, it was determined that adequate vegetation is present for ground cover and soil protection.

The hydrologic functioning of these communities seems to be intact. The over-all risk for this community type is moderate. This assessment is based on the assumption that recreation use will continue to increase and current livestock grazing practices will continue.

Mountain Mahogany/brush
Mountain Mahogany/brush communities are present throughout the analysis area but are more common in the lower one-third of the Greys River drainage. These communities are associated with dry slopes and benches above the valley bottom and at times are intermixed with bitterbrush and sagebrush communities. Curlleaf mountain-mahogany is the primary type of mahogany in the analysis area. Curlleaf is considered to be a local climax dominant species with a transition zone between desert steppes, plains and higher elevation coniferous forests. These communities typically have a sparse understory with considerable bare soil. These community types produce substantial forage for big game. At lower elevations, these communities are extremely important as ungulate winter range due to their production of highly palatable browse.

Mountain mahogany communities in the analysis area are considered to have a high risk of decline. Most of these communities are in an old structural condition and are not successfully regenerating. Wild ungulates and small mammals are adversely affecting this species' ability to regenerate. In addition to winter browse, its large seeds are a preferred food of rodents. The Greys River drainage is also on the northern fringe of its natural range.

Mountain Shrub
Mountain shrub communities occur throughout the lower portion of the analysis area, particularly along the Greys River below the confluence with Little Greys River. These areas are slightly moister than pure sagebrush types and slightly drier than quaking aspen communities. These communities are typically adjacent to riparian areas, under conifer stands and on relatively rocky sites. A wide variety of shrubs, grasses and forbs are associated with this community type. The mountain shrub community type is a complex of several different species that share some common characteristics.

Wherever mountain shrub communities are located in wildlife winter range, browse intensity is high. Forest-wide, more than 70% of the total acreage is in a downward trend in extent and condition. This can be expected to continue as long as elk populations are concentrated and kept at higher than historic levels.

These communities are at a high risk for reduction in size and productivity. Loss of berry production, reduced grass cover and an increase in disease will adversely affect its potential value to wildlife and livestock. Its frequency and patch size is decreasing due to fire suppression and subsequent sage encroachment.

Big Sagebrush
Big sagebrush communities occur throughout the length of the analysis area, primarily in the dry bottomlands, benches, and south and west facing slopes. These communities are interspersed with open meadows, willowed valley bottoms, conifer stands and occasional aspen patches. Mountain (*Artemisia tridentata var. pauciflora*) and Vasey big sagebrush (*A. t. var. vaseyana*) are the most abundant varieties in the analysis area with subalpine big sagebrush (*A. t. ssp. speciformis*) and some basin big sagebrush (*A. t. ssp. tridentate*) also occurring.

Distribution of mountain, Vasey, and subalpine big sagebrush is related to temperature, precipitation, and soil water-holding capacity. Mountain big sagebrush occupies relatively warm, dry sites within the assessment area; it is associated with bluebunch wheatgrass, antelope bitterbrush, arrowleaf balsamroot, and mountain snowberry. Subalpine big sagebrush occupies cool, moist sites in association with slender wheatgrass, northwest cinquefoil, sticky geranium, spike trisetum, purple oniongrass and Raynold's sedge. Vasey big sagebrush and Idaho fescue are associated with both groups of species.

The fire regime of the big sagebrush communities has been altered by fire suppression and livestock grazing. Because of direct and indirect fire suppression the current mix of structure and age classes is outside the historic range of variation. About 90 percent of the big sagebrush communities have over 15 percent shrub canopy cover. The increase in big sagebrush canopy cover has replaced the historic mosaic of structure and age classes with very large patches of uniformly dense sagebrush.

The increase in big sagebrush density and cover has been accompanied by a decrease in herbaceous cover. This is due to increased competition from sagebrush and heavy grazing by livestock and wildlife. Total ground cover is within the historic range of variation over most of the analysis area; however, continued decline of herbaceous vegetation could be accompanied by an increase in bare soil, which would result in more erosion and sediment production.

Fire suppression and heavy grazing have greatly altered the fire regime of the analysis area by lengthening fire intervals. This has caused a shift toward older age classes and denser sagebrush canopies throughout the analysis area. The pre-settlement mosaic of age and structure classes has been replaced by large areas of dense, old sagebrush. This change has been accompanied by reduced herbaceous production and increased bare soil.

Tall Forbs

Tall forb communities are characterized by a large array of luxuriant, tall (16-48 inches) mesic forbs. These communities occur on all aspects and slope gradient, near springs, along streams, in small forest openings and large, open high elevation parklands where soils are deep and soil moisture is adequate for nearly season-long growth. Historically, these community types were common at elevations above 7,000 feet and in precipitation zones where annual precipitation is greater than 35 inches. These sites are characterized by deep, well-drained, productive soils.

Common forb species include: monkshood, nettleleaf, columbine, asters, larkspur, fleabanes, geranium, stickseed, cow parsnip, ligusticum, bluebells, osmorhiza, lousewort, cinquefoil, coneflower, meadowrue, valerian, groundsel and goldenrod. In climax condition, many species are present with no one species showing dominance. Grass and grass-like species in these communities include: Raynolds sedge, slender wheatgrass and oniongrass. Shrubs and trees are mostly absent in these communities with an occasional quaking aspen patch encroaching.

It is estimated that 25 percent of the tall forb communities in the analysis area have been lost due to soil loss from historic sheep grazing and artificially high elk populations. The most dominant species now found in the majority of remaining tall forb communities is Wyethia at lower elevations and western coneflower at high elevations. Unlike many of the other species historically comprising tall forb communities, Wyethia does not require an A or B horizon soil layer. Acting as a pioneer species, it often dominates these communities. Also, unlike some grass and forb species, Wyethia produces no stolons or rhizomes, forms a very slender, deep tap root and becomes dormant relatively early in the growing season. These characteristics make Wyethia a species that provides very little protection against soil erosion

Grassland Meadows

Three distinct grassland meadow community types occur in different environments throughout the analysis area. These environments are high elevation grassy ridge tops and forb lands, wet and dry open meadows and parkways, and open grassy hillsides. Typical vegetation in this community type includes Idaho fescue, bluebunch wheatgrass, bluegrass, needlegrass, wheatgrass, tufted hairgrass, timothy, some dryland sedges, bistort, cinquefoil, clover, geranium and lupine.

Intensive grazing by both livestock and elk has been the single largest influence for change in this community type. Continued livestock grazing and extremely elevated elk populations are causing these communities to be concentrated in smaller and smaller areas. Impacts include soil compaction, loss of ground cover and loss of the "A" soil horizon. Grazing by livestock and wild ungulates, combined with fire suppression has allowed an increase in conifer encroachment into many grassland communities.

These communities are considered to have a high risk of change due to fire suppression, recreation, wild ungulate and livestock grazing and the spread of noxious weeds. The average percentage of bare ground is greater than 20% with drier sites having much higher percentages of bare ground. The loss of the A soil horizon has changed the structure and composition of many of these communities.

Riparian Zones / Wetlands

Riparian community types exist throughout the length of the analysis area. This community type has been described as including all areas where free or unbound water is present, at least seasonally, in the upper soil profile. These communities can be found in association with seeps, springs, bogs, lakes or streams. They include all vegetative growth forms including trees, shrubs, grasses, grasslikes and non-vascular types of ground cover.

Most riparian/wetland communities in the analysis area have been modified by human activity. Due to the presence of water, cool temperatures and accessible terrain, riparian areas throughout the Greys River drainage are intensively used for human activity. Impacts have resulted from the development of roads and trails, recreation uses such as fishing, camping, wildlife viewing, hunting and commodity uses such as trapping, tie hacking, ranching, gold mining and the collecting of unique plants for food, fiber, and medicinal uses.

Riparian areas have been used by livestock since the late 1800's. Records from the early 1900's indicate that an average of 1500 cattle and 345,000 sheep either grazed in or were trailed through the Greys River watershed each summer. Historically, excessive sheep grazing and trailing on the Wyoming and Salt River ranges eliminated much upland vegetation and promoted areas of severe soil loss with extensive rilling, gully formation and sediment deposition in streams and rivers. The stock driveways were closed in the late 1960's and early 1970's. Since then, some portions of the driveways have recovered sufficiently to allow them to be incorporated into adjacent grazing allotments.

The risk to each riparian site is dependent, in simplified terms, on the vegetation present (kind), the amount (how well it protects the site), the soils (erodability and productivity), and the topography (rockiness and slope of the land). It is clear that the condition of riparian areas has changed in the previous 100 years. Many areas may not be capable of returning to their former condition due to soil losses and hydrologic changes. Due to the high demand for human activity and the limited resources at each site, there will always be a potential risk for overuse.

Wetland areas are also at risk due to their desirability for forage production. This will be especially important in dry years when large animals can gain access to previously unused plants and cause soil compaction.

Noxious Weeds and Non-Native Invasive Plants

Eight species of noxious weeds are known to be present in the Greys River drainage. Treatment to control these weeds has been a priority for many years. Control measures have been reasonably successful on some species, and not as successful on other species. A listing of all the weed species known to be present by Intermountain Region Priority Groups is included here, followed by a brief description of the current situation for each species:

Group I	Group II	Group III
Dyer's woad Isotis tinctoria	None	Canada Thistle Circium arvense
Leafy spurge Euphorbia esula		
Musk thistle Carduus nutans		
Scotch thistle Onopordon acanathium		
Spotted knapweed Centaurea maculosa		
Yellow toadflax Linaria vulgaris		
Perennial pepperweed Lepidium latifolium L.		

Dyers Woad: Present in the North Three Forks and Corral Creek drainages as scattered individual plants and in small patches of less than 1/2 acre each. They are being treated annually by hand pulling and chemical methods.

Leafy spurge: Present along the Greys River Road near Box Y Ranch, mouth of Squaw Creek, Gillis Flat, Sheep Creek, and Trail Creek. These recently became established as small populations. They are being treated annually with chemical and biological methods.

Musk thistle: Present throughout the drainage. Heavy infestations in Sheep Creek, mouth of Blind Bull, and along the Greys River Road were treated chemically over the past 15 years, significantly reducing the extent and density of the infestations. Continued chemical treatment and biological control agents are apparently holding this species in check, but not eradicating it.

Scotch thistle: Two individual plants were identified at the Forks of Greys River and Little Greys River several years ago. They were hand pulled. No other plants have been found since that time.

Spotted knapweed: Initially found at the forks of Little Greys and Greys Rivers about 15 years ago. Has been treated annually with chemicals and biological agents. It is now found along the Greys River Road from Alpine to about 2 miles above the Forks, and along the Little Greys River Road to about 6 miles above the Forks.

Yellow toadflax: Present in small, isolated patches in the North Fork of Sheep Creek, near the mouth of Ridge Creek, and possible other uninventoried locations. Treated with chemicals wherever found.

Perennial pepperweed: Present in 2 known locations, one along the Little Greys River and another near the mouth of Murphy Creek. This is a new arrival in the drainage, and is being treated annually with chemicals.

Canada thistle: Present throughout the drainage. It has been placed in Category III, which means that it has become so well established and widespread that efforts to control or eradicate it would not be economically feasible nor practically possible. It is not treated under current policies.

Changes in Plant Composition and Distribution

Four undesirable species of plants warrant mention and action to reduce their impact on vegetation conditions. They are: Cheatgrass (*Bromus tectorum*), Bulbous bluegrass (*Poa bulbosa*), Tarweed (*Madia glomerata*), and Mule Ears (*Wyethia amplexicaulis*).

Cheatgrass is an exotic annual that has entered the drainage within the last few years. It was first discovered on sheep bedgrounds along the north side of the mouth of Deadman Creek. Its negative and widespread impacts on vegetation condition and forage production are well documented on thousands of acres of rangeland within the continental United States. It is spreading slowly into adjacent disturbed sites and/or those that are heavily used by grazing livestock and recreationists.

Bulbous bluegrass is an exotic plant that is now found along much of the mid to lower stretches of the Greys River, principally in the flats and meadows that receive heavy use by cattle and recreationists. The natural vegetative diversity has historically been replaced by Kentucky bluegrass through repeated overuse, and the Kentucky bluegrass is now being replaced by the Bulbous bluegrass. This grass does not provide effective soil-holding capabilities nor does it supply much usable forage, compared to the sedges, grasses, forbs, and shrubs that were present historically. Its presence indicates a long history of overuse, whether by grazing, recreation or other disturbance factors.

Tarweed is also increasing in selected locations, principally where disturbance from road building, timber harvest, grazing, or recreation have left areas of bare soil. It is also an indicator that proper management practices are not being followed, or revegetation of disturbed soil by natural or artificial means has not been effective.

Mule-ears is a native plant that appears to be increasing in disturbed areas of the drainage. It is somewhat soil specific, and does not spread into all soil and vegetation types.

Grazing

Livestock Numbers

At the present time, 1193 cattle are permitted to graze on four allotments and 22,296 sheep are permitted to graze on 20 allotments within the Greys River drainage. These livestock numbers are summarized by allotment, season of use, and grazing system in Table 2.16 on the following page.

Table 2.16. Grazing Allotments and Permitted numbers.

*Portions of this allotment are outside the analysis area.

ALLOTMENT	TYPE	NUMBER	SEASON	GRAZING SYSTEM
*Bailey Creek /Bear Wallow	Sheep	1300	7/1 – 9/8	2-year rest-rotation
*Bear Creek	Sheep	1300	7/6 – 9/20	2-year rest-rotation
Big Greys	Cattle	610	6/16 – 9/30	Deferred-rotation
Birch Creek	Sheep	Vacant	n/a	n/a
Black Canyon	Sheep	1315	7/6 – 9/20	7-year rest-rotation
Blind Bull	Sheep	1320	7/6 – 9/20	7-year rest-rotation
Blind Trail	Sheep	1300	7/11 – 9/30	7-year rest-rotation
Cabin Creek	Sheep	1315	7/6 – 9/20	7-year rest-rotation
Corral Creek	Sheep	1200	7/16 – 9/15	Season-long
*Cottonwood	Sheep	1200	7/11 – 9/15	Season-long
Deadman	Sheep	1315	7/6 – 9/20	7-year rest-rotation
*Elk Mountain	Sheep	596	7/6 – 9/10	2-year rest-rotation
Grizzly Basin	Sheep	1435	7/11 – 9/30	7-year rest-rotation
La Barge	Cattle	878	7/1 – 9/30	Season-long
Little Greys	Cattle	565	6/15 – 10/7	Deferred-rotation
Marten Creek	Sheep	1200	7/6 – 9/15	3-year rest-rotation
Mink Creek	Sheep	1200	7/11 – 9/15	Season-long
North Middle Ridge	Sheep	1300	7/11 –9/30	2-year rest-rotation
*Pickle Pass	Sheep	1300	7/6 – 9/20	6-year rest-rotation
*Snake River	Sheep	596	7/6 – 9/10	2-year rest-rotation
South Fork Sheep Creek	Sheep	1200	7/6 – 9/15	3-year Rest-rotation
Stewart Creek	Sheep	1300	7/11 – 9/30	7-year rest-rotation
Three Forks	Sheep	1200	7/6 – 9/15	3-year rest-rotation
*Virginia Peak	Cattle	18	6/16 – 9/30	Season-long
*Virginia Peak	Sheep	1300	7/6 – 9/20	2-year rest-rotation
White Creek	Sheep	Vacant	n/a	n/a

Allotment Status and General Range Conditions

The Big Greys Cattle Allotment has been grazed under a 3-pasture deferred rotation system since the early 1960's (season-long before that time). The grazing system appears to be sound, and provides for plants to meet their physiological growing requirements every third year. Forage utilization has been measured at or near Forest Plan Standards and Guidelines. Vegetative diversity, species composition, and forage production are considered to be below desirable levels. Increasing recreation uses along the river corridor are also causing more impact on the vegetation each year. Noxious weeds and non-native invasive plant species are expanding. It is very difficult to determine how much of this negative impact should be attributed to grazing, how much to recreation uses, how much to wintering wildlife, and how much to road influences such as dust and

sediment movement. There is also some problem with cattle straying outside the boundaries of the allotment, into side drainages. The fences and some cattle guards have not been well maintained, and do not hold the cattle. This makes it very difficult for the rider to clean each unit as the cattle are moved to the next unit. Some cattle can normally be found in each unit, or outside the allotment boundary, throughout the grazing season. Sheep from adjacent allotments are allowed to go to the river to water. They often stay along the riparian area longer than is necessary. There is a need to thoroughly analyze the allotment, resolve these dilemmas, and implement an overall management scheme along the river that will provide for the health and diversity of the vegetation, wildlife, grazing livestock, recreation, and other uses.

Map 2.2 on the following page illustrates the allotment area boundaries.

MAP 2.2 GRAZING ALLOTMENTS

The Little Greys Allotment is currently being grazed under a 4-pasture deferred rotation system, with two trailing units that are used to trail the cattle to and from the allotment. From the early 1960's to 1986, the units were grazed in a 6-pasture rest-rotation system, and season-long before that. The grazing system appears to be sound and working well. However, observations of vegetative production from 2000 through 2003 indicate that the permitted number of livestock cannot be sustained during extended drought periods without impacting vegetative condition. Overall, forage utilization, vegetative composition and soil conditions appear to be within Forest Plan Standards and Guidelines. Some of the unit fences are nearing the end of their useful life and need to be reconstructed.

The Mink Creek Sheep Allotment is grazed season long, and has been for many years. There are a few problem areas that should be addressed as the allotment management plan is scheduled for review, but overall the grazing management appears to be acceptable.

The Cottonwood Sheep Allotment is grazed season long. It is a very large allotment. In fact, one band now grazes where 5 bands did historically. The permittee has room to vary the grazing route and intensity to match varying conditions from year to year. This band is the only band that is currently allowed to trail out through Sheep Pass. This has not been a problem, but needs to be monitored.

The Corral Creek Sheep Allotment is permitted for 1200 ewes with lambs season long. Range analysis data and prior allotment inspections indicate that the grazing capacity is somewhat less. However, management of the allotment has improved over the last five years. The permittee has annually grazed 1200 dry ewes. Inspections of the allotment during this time have indicated stable and improving conditions. With the proper management, it appears that this allotment can sustain grazing at this level. This band trails to and from the allotment on the Smiths Fork Road over Commissary Ridge, through the pass immediately east of Sheep Pass, and across the head of Spring Creek. This also needs to be monitored.

The Three Forks allotment is permitted 1200 sheep. This allotment is grazed on a five-year rest rotation. Portions of this allotment were heavily impacted by sheep grazing in the early and mid-1900's. Inspections since 1999 indicate that vegetative cover is increasing over most of the allotment. Current management appears to be sustainable.

Marten Creek and South Fork Sheep Creek sheep allotments are managed as part of a complex with 3 allotments on the east side of the Wyoming Range. Each allotment is rested every third year. The permittee has taken some non-use the past few years, so the allotments have received more than the scheduled rest. Very little data is available on these allotments. However, inspections in 1999 and 2001 indicated that the higher elevation range areas are being heavily impacted by sheep grazing. Since 2002 the permittee has voluntarily taken non-use for resource protection. He has grazed the Marten and Sheep Creek allotments every other year with one band of sheep. This should allow some improvement.

Cabin Creek, Black Canyon, Blind Bull, Deadman, Blind Trail, Grizzly Basin, and Stewart Creek sheep allotments are grazed by 6 bands, with each allotment being rested every seventh year. Range analysis data and the Allotment Management Plan approved in 1986 indicate that the capacity may be less. The AMP suggests that only 5 bands be allowed to graze the allotment complex until the grazing capacity can be firmed up. However, after negotiation with the permittee, 6 bands have been permitted to graze the allotments each year. The grazing capacity has not been firmed up. This needs to be done. Two prescribed burns have been completed on the allotment complex in the past two years. The permittee has cooperated with revising the grazing schedule to rest those burns. There is some conflict between the sheep loading operation at the mouth of Deadman and crucial winter range. All six bands are loaded on trucks at that location. This takes about a week, and results in some grazing on the crucial winter range after the growing period. The permittee has altered his loading operation to alleviate some of this impact. It should be monitored and analyzed to determine if the current procedures are adequate. Sheep from these allotments routinely stray onto adjacent allotments. Efforts should be made to reduce this unauthorized use.

Bear Creek and Virginia Peak sheep allotments are each grazed in combination with two other allotments that are not in Greys River Drainage. Three bands of sheep are grazed on three of the four allotments, with one allotment being rested each year. While little actual data is available, this system appears to be adequate, with forage and range conditions probably within Forest Plan Standards and Guidelines. Unauthorized grazing in the Henderson, Anderson, and Pearson Creek area by cattle from the Big Greys Cattle Allotment is a problem each year. This needs to be corrected to allow the area to receive true rest and avoid excessive forage utilization. North Middle Ridge, Bailey Creek and Bear Wallow sheep allotments are grazed by one band of sheep, with each allotment being rested every other year. This system was initiated in 1997, when the vacant Bailey Creek and Bear Wallow allotments were placed into a rest rotation with North Middle Ridge. The NEPA indicated that this system would prove favorable. It needs to be monitored and confirmed.

Snake River and Elk Mountain sheep allotments are grazed by one small band of sheep, with each allotment being rested every other year. This system was initiated in 1997, when the vacant Elk Mountain allotment was placed into rest rotation with Snake River. The NEPA indicated that this system would prove favorable. Since this time, monitoring has shown significant management problems. Although forage utilization appears to be well within Forest Plan Standards, bedding and trailing have had substantial impacts to localized areas. Frequent use of bedgrounds, saltgrounds and watering areas has denuded several areas on each allotment. The permittee is currently restricted from grazing these allotments until he develops a management strategy to avoid use of these heavily impacted areas.

Pickle Pass sheep allotment is managed as part of a complex with 5 other allotments on the east side of the Wyoming Range and in the Hoback River drainage. The current grazing system was initiated in 1985. An area in the Bare Hole was also added to Pickle Pass at that time to increase the grazing capacity. The allotment is rested every sixth year. An Environmental Impact Statement is currently being written for this allotment complex.

Vacant Allotments

The White Creek/Man Peak Sheep Allotment has been vacant since the early 1970's, when the grazing permit was waived back to the Forest Service. The current allotment is actually a fairly small area that was left over when the adjacent allotments were realigned in 1980, in an attempt to provide a usable allotment for a band of sheep (Birch Creek/Star Peaks) and exclude sheep grazing on the Star Valley Front. It does not contain enough area or suitable range to support a band of sheep. It is very steep, rugged terrain, with many of the slopes either composed of ledges or heavily timbered. The range which has been classified as suitable for sheep grazing is located in several areas that have been clear cut for timber on the south side of

White Creek; in patches of conifer/timber stands that are used heavily by elk for parturition, forage, breeding, and hiding cover; scattered between ledges and extreme slopes in the head of White Creek; and in the riparian bottom of White Creek. The clear cuts are transitory range. These clearings and the adjacent timbered slopes are also prime elk parturition and breeding areas. An evaluation was initiated in the late 1980's to determine if this allotment should be added to the Big Greys Cattle Allotment. Cattle have been allowed to graze there each year as the adjacent unit is used. Inspections since 1999 have indicated that this area of White Creek can be grazed by cattle if the permittees are willing to intensively manage the area.

The current Birch Creek/Star Peaks was formed in 1980 by revising the boundaries of it and adjacent allotments. This was done with the objective of excluding sheep from the Star Valley Front, while giving the permittee enough range on the Greys River side of the Salt River Range to successfully run a band of sheep. His permitted numbers were increased from 715 head to 1050 head, to give him enough numbers for his operation to be economically viable. This was only partially successful. The sheep were allowed to trail to and from the allotment through Prater Canyon, so some grazing still occurred on the fragile slopes. The 2092 acres of suitable range inventoried on the allotment, scattered through very rugged and timbered terrain, were apparently not enough to support the sheep. After several "unsuccessful" years in a row, the permittee voluntarily waived his grazing permit back to the Forest Service in 1993. The allotment has not been grazed since that time.

The Squaw Creek/Weiner Creek Sheep Allotment has been vacant since 1997 (see narrative below). It contains good habitat for moose, elk, mule deer, and other wildlife species. The steep, fragile slopes covered by sparse sub-alpine vegetation in the higher elevations exhibit the effects of historical overgrazing, with exposed bare soil and sediment movement.

Allotments/Areas Closed to Grazing

The permit for the Squaw Creek/Weiner Creek Sheep Allotment was waived to the Forest Service in 1997. The permittee received some reimbursement from the Rocky Mountain Elk Foundation, as the area encompassed by this allotment serves as a major parturition area for the elk from the Greys River Elk Feedground. It is recommended that portions of this allotment be designated as a forage reserve that may be used at infrequent intervals if needed to protect resources on other areas of the Forest.

The Alpine Game Withdrawal has been closed to grazing since approximately 1929. It serves as critical spring-fall transition and migration range for the elk traveling to and from the Greys River Elk Feedground. It is recommended that it remain closed to grazing.

A portion of the Sheep Creek Watershed was closed to grazing when the sheep driveways were closed about 1970. Part of this has been re-opened to grazing, to provide a route for sheep to graze the adjacent Black Canyon Allotment on alternate years. It is recommended that the remainder stay closed to grazing, due to the steep slopes, fragile soil, and sparse ground cover.

Dick Creek and Willow Creek lie within the Cottonwood Creek Sheep Allotment, but grazing is not authorized in that area by provisions of the Allotment Management Plan. It is a critical elk parturition area.

The area including Box Canyon Creek south to Marten Creek, on the west slope of the Wyoming Range is not grazed. It was set aside to allow some buffer between domestic sheep and the Bighorn sheep from the Mount Darby/Fish Creek Mountain herd. It provides excellent habitat for elk, mule deer and black bear. It is very steep and rugged. Domestic grazing is not recommended, regardless of the status of the Bighorn.

Wildlife

The Bridger-Teton National Forest supports 74 mammal species and 208 bird species; most of these species are present within the assessment area (BTNF 1990).

Few amphibians and reptiles are found in the Greys River drainage, probably due to the severe winters. Chorus frog, Columbia spotted frog, and tiger salamander are the only amphibians known to occur in the watershed (Patla 2000). Western garter snake is the most common reptile, although rubber boas are also occasionally seen.

Big game and trophy wildlife including black bear, elk, moose, mountain lion, and mule deer are found in all assessment area watersheds. Bighorn sheep are present in the Wyoming Range, along the assessment area's eastern boundary. Mountain goats occasionally roam onto Bradley Mountain from the Palisades Range population.

Although no threatened or endangered species reproduction is currently observed within the assessment area, a number of listed species have been present in recent years. It is likely the breeding status of some federally listed species in this area may be changing. Bald eagles utilize the area but major water features typical of nest sites are lacking. Canada lynx have been present in the upper drainage and breeding has been documented on the eastern side of the Wyoming Range in recent years. During 2002 a young male grizzly bear involved in a domestic sheep depredation event was killed in the Greys River drainage. There continue to be unverified reports of grizzlies from within the assessment area. Predation by wolves has been confirmed on the district and also reported from the Greys River winter feed ground.

Big Game

The assessment area provides habitat for several ungulate species including elk, moose, and mule deer. The elk population in the "Afton" herd unit has been slowly reduced over several years to be close to the state's long term management objective. This has been accomplished through harvest regulation. Moose in the "Sublette" herd unit have been in a downward trend for several years and are at present well below the management objective. Mule deer in the "Wyoming Range" herd unit are substantially below management objective due to poor condition of the winter range outside of the assessment area. Historic overgrazing by livestock, a long history of fire suppression, and the extended drought have left the winter forage base in such poor condition that loss of mule deer can be high any year winter severity is above average. Many of the preferred browse plants for mule deer have either been lost or are currently in such poor condition that they are producing only minimal leader growth.

Table 2.17. Big-game populations in part using the Greys River Watershed

Species	Herd Unit	Crucial Winter Range (acres)	WGFD Population Objective	2003 Post -Hunt Population
Elk	Afton	34,600	2,200	2,000
Moose	Sublette	57,412	5,500	3,800
Mule Deer	Wyoming Range	6,452	50,000	32,000

Bighorn sheep and mountain goats have been sighted occasionally in the assessment area (WGFD WOS). A small population of bighorn sheep was re-introduced east of the Wyoming Range crest in the Mount Darby/Fish Creek Mountain area in the late 1980's. Individuals from this population can occasionally be seen within the assessment area, along the crest of the Wyoming Range. With the significant increase of winter snowmobile activity, a few bighorn sheep have been utilizing man-made trails and have been seen on some windswept areas of the Greys River drainage.

In the mid 1990's the Mount Darby/Fish Creek bighorn population experienced a steady decline, most likely due to a disease outbreak. In February, 2002 it was estimated there were 55 animals, down from a high of approximately 150 in 1994. Bighorns do not thrive on a long-term basis or expand their range when adjacent to domestic sheep allotments. There are no current proposals to expand bighorn sheep range.

Mountain goats have been observed on Bradley Mountain and in the Greys River watershed near Stewart Creek and Squaw Creek over the last three years. In 1999 a mountain goat was observed on the Grayback Ridge above Waterdog Lake. Mountain goats have been dispersing, in small numbers, from the core population of the Palisades Herd located along the Snake River Range in Idaho and Wyoming. The few individuals that may reside in the Greys River Ranger District are not believed to comprise a viable population at this time.

The WGFD considers the black bear population to be stable to increasing. Spring bear hunting using bait stations is very popular in the drainage. Hunters and outfitters compete for the best bear

bait sites.

Mountain lions are present in the assessment area and the population is stable to increasing (WGFD). An annual mortality quota governs legal take of mountain lions in the assessment area; the current annual mortality quota for the Greys River hunt area is 8, of which 4 may be females.

Crucial Winter Range

Crucial winter range is defined as the area occupied by 80% of the big-game population during eight of ten winters. Winter snow depths force mule deer to migrate out of the drainage. Most mule deer migrate either south toward Cokeville and Sage Junction, or east toward Big Piney. A few mule deer do remain in the Greys River drainage in winter.

Approximately 60,000 acres of moose winter range are positioned along the bottoms of the Greys and Little Greys Rivers and adjacent drainages. The extensive spruce-fir stands provide hiding and thermal cover. These stands and willow bottoms, with adjacent meadows and open slopes containing mountain shrubs, provide fall and winter forage.

The Greys and Little Greys River roads are both used as groomed snowmobile trails in winter. Moose frequently travel groomed trails, due to reduced energy expenditures. This causes direct and potentially hazardous conflicts, as moose tend to either flee snowmobiles, causing unnecessary energy expenditure, or they become aggressive. Conflict appears to be minimal in many years due to few places along the rivers where snowmobilers leave the trail or cross the rivers. Steep, timbered slopes adjacent to the river provide moose thermal and escape cover. Moose are able to disperse away from the trail on normal and mild winters. In years with deeper snow, however, they congregate in the willow bottoms and slopes adjacent to the rivers. Some displacement of moose away from the trails occurs in such years.

Suitable native elk winter range is limited in the drainage. Less than 200 elk winter on open ridges or along the willow bottoms during milder winters. Most elk that summer in the assessment area migrate to either the Greys River Elk Feedground (south of Alpine on Highway 89) or the Forest Park Elk Feedground. Some of the elk from the Little Greys drainage migrate to the Dog Creek Elk Feedground on the Snake River. Buffer areas around feedgrounds are closed to snowmobile activity from November 15 to April 30 to reduce disturbance. A small number of elk may migrate out of the assessment area to other winter ranges.

The Forest Park Elk Feedground was established in response to public concern over winter mortality in the Forest Park area (WGFD 1996). Historically small numbers of elk wintered along the middle and upper reaches of the Greys River and were subject to high levels of natural winter mortality. With the increased use of snowmachines in the mid- to late 1970's, segments of the public expressed concern over the winter mortality; and that they would initiate elk feeding if the WGFD did not petition the USDA Forest Service to establish a feedground. The WGFD submitted a special use application, which was approved by the USDA Forest Service, formally establishing the Forest Park Feedground in April 1979.

Total identified crucial winter range is 61,554 acres or 21% of the drainage. A cooperative effort

by the USDA Forest Service and WGFD to inventory the aspen and sagebrush/grassland habitat types in these and other potential areas was initiated in 1994. Results indicate that these areas provide elk forage and cover on mild winters, but are inadequate to support large numbers of elk during normal to severe winters. Most of the inventoried areas are in late seral stages. Habitat treatments (e.g. prescribed burns) would enhance watershed health and winter forage for large ungulates.

Brucellosis

Brucellosis is present in elk that are annually fed at the Forest Park and Greys River Feedgrounds. In accordance with its Brucellosis-Feedground Habitat program, the WGFD has developed an integrated management plan with the objectives of reducing the incidence of brucellosis in the elk population, and eliminating the possibility of the disease being transmitted from elk to domestic livestock.

Brucellosis is transmitted to uninfected animals through contact with aborted fetuses and fetal membranes and fluids. When elk are concentrated on the feedgrounds, the potential exists for other elk to come into contact with Brucella infected materials. Habitat enhancement projects that increase available winter forage may reduce elk dependence on supplemental feed, thus potentially reducing the time spent on the feedground and the associated risk of brucellosis transmission.

The WGFD initiated the Strain 19 elk vaccination program on Greys River and Forest Park feedgrounds in 1985 and 1988, respectively. Calfhood coverage has averaged nearly 99% on both feedgrounds annually. The WGFD traps and tests for brucellosis in feedground elk to determine efficacy of the vaccination program and incidence of the disease. Elk serology data on the Greys River feedground from 4 years in the 1970's (pre-vaccination) reveals 46% of elk tested seropositive for Brucella antibodies. Seroprevalence from 1993-2004 (post-vaccination) has averaged 29%. However, recent serology indicates an increasing trend in seroprevalence, the cause of which is undetermined, but will continue to be monitored. Serology data collected from elk on Forest Park feedground during 2001 and 2002 indicate 30% seroprevalence.

Transitional Ranges

Mule deer migration corridors parallel the Greys River, Little Greys River, Sheep Creek, Blind Bull Creek, and Middle Ridge. There is mule deer movement along these features during spring and fall migrations.

The Alpine Game Withdrawal has been closed to livestock grazing for many years; it serves as critical spring-fall transition and migration range for elk traveling to and from the Greys River Elk Feedground.

In 1995 and 1996, WGFD and Forest Service personnel inventoried approximately 14,500 acres (over 25 locations) in the Greys River watershed. Much of the shrubland vegetation had reached near-climax successional stages; aspen and mountain shrub communities were dense and overmature, with a large percentage of dead and dying plants. These important habitats are converting to conifer forest and sagebrush types. Unless succession is set back, watershed function and health, along with big game winter and transitional range values, will continue to decline. A

watershed scale mosaic of seral stages should be provided.

Parturition Range
Mule deer inhabit the entire drainage during spring and summer months. Summer range provides forage and cover during parturition and fawn rearing periods.

Moose use the entire drainage for parturition and calf rearing. Habitat conditions for moose are good but could be enhanced with a better mix of seral stages. The extensive willow bottoms are considered to be in good condition, with an excellent variety of willow species of differing age classes. The willow bottoms, with adjacent meadows and open slopes containing mountain shrubs and other forage species, provide a variety and abundance of spring and summer forage.

The Squaw/ Weiner Creek, Birch Creek/Star Peaks and White Creek/ Man Peak Allotments serve as major parturition areas for elk. These are all allotments that are closed to livestock grazing or vacant. The Alpine Game Withdrawal and portions of the Cottonwood Creek Allotment are also elk parturition areas that are closed to domestic grazing.

Security Areas
The BTNF Land and Resource Management Plan (BTNF 1990) defines security areas as areas to which big game retreat for safety when disturbance in their usual range is intensified by activities such as logging or during hunting season. The value of a security area depends upon the distance from an open road and the amount of cover. Quantitatively, security for elk is minimally 250 contiguous acres of hiding cover that is more than one-half mile from open roads (Leege 1984, Hillis et al. 1991).

Security areas were modeled by selecting mature conifer stands greater than 250 acres in size and more than one-half mile from existing roads. Vegetation and road data used were from the data sets used in formulation of the BTNF Land and Resource Management Plan (BTNF 1990). Addition of the hiding cover parameter to the model greatly reduced the available security areas, to probably unrealistically low percentages. Mature conifer stands with greater than 35% crown density were identified as hiding cover in the BTNF Land and Resource Management Plan (BTNF 1990) vegetation data. Hillis et al. (1991) also suggested that factors such as terrain can influence security areas, with rugged terrain providing security and gentle terrain reducing security. The mountainous terrain within the Greys River watershed may increase elk security. Models represent a simplification and generalization and may not accurately reflect the actual conditions.

Threatened, Endangered, and Sensitive Species

Threatened and endangered species are managed under the authority of the Endangered Species Act of 1973 (PL 93-205, as amended) and the National Forest Management Act (PL 94-588). The Endangered Species Act requires Federal agencies to ensure that all actions which they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of their critical habitat.

The United States Fish and Wildlife Service (FWS) provided the Bridger-Teton National Forest with a Forest-wide list (ES-61411/WY7641) of threatened, endangered, and proposed species

which may occur on the Forest. Threatened and Endangered species included on that list are presented in Table 2.7.

Table 2.18. Threatened and Endangered Species of the Bridger-Teton National Forest.

COMMON NAME	SCIENTIFIC NAME	STATUS
Canada lynx	*Felis lynx canadensis*	Threatened
grizzly bear	*Ursus arctos horribilis*	Threatened
gray wolf	*Canis lupus*	Experimental
bald eagle	*Haliaeetus leucocephalus*	Threatened

(Also listed are the Kendall Warm Springs dace, bonytail, Colorado pikeminnow, humpback chub, and razorback sucker. These species, or potential habitat for them, are not present within the analysis area, or downstream.)

Threatened Species

Bald Eagle

A significant nesting population of Bald Eagles occurs in the Greater Yellowstone area including northwestern Wyoming with nesting activity concentrated along the Snake River drainage. The eagle population has increased exponentially since 1970 and nesting distribution has expanded over the past decade to include the Salt and Green River drainages (WGFD records). Bald eagles are closely associated with water, with nest sites commonly less than one mile from a lakeshore or riverbank. Large trees are necessary to support eagle nests, particularly cottonwoods and several conifer species. Commonly used nest trees in the Greater Yellowstone Area include spruce, cottonwood, lodgepole pine, Douglas fir, and whitebark pine (GYEBEWT 1983). Nest trees are often the largest trees in the stand, providing access to the nest. Typically, there are alternate nests within or in close proximity to the nest stand. Snags and open-canopied trees near the nest site and foraging areas provide favorable perch sites. Old-growth stands with their structural diversity and open canopies are an important nesting habitat for bald eagles.

Bald eagles are more commonly seen during the winter, but are present in the drainage year-round. They use the corridors adjacent to the Greys and Little Greys Rivers for travel, foraging, and perching. WGFD conducts annual monitoring of known nest sites in Wyoming. The nearest known nest sites are on the Snake River near Alpine, Palisades Reservoir (multiple sites in Idaho), and along the Salt River in Freedom and Thayne. There is an eagle roosting site near the mouth of Kinney Creek.

Bald eagle nest territories are characterized by large surface areas of open water in close proximity to the nest site, typically, lakes or larger rivers. Potential for bald eagle nesting in the analysis area appears to be limited because water surface area is small and availability of fish is further reduced by the elevation of the area and delay in the onset of the open water period. Stream gradient also reduces the amount of area in pools conducive to fishing. However, as the population continues to expand, eagle pairs may initiate nesting within the project area. Management and monitoring of nest sites that may occur should follow guidelines in the Greater Yellowstone Bald Eagle Management Plan.

Canada lynx

In March 2000, the USFWS listed Canada lynx as a threatened species. Lynx are considered a species of special concern by Wyoming.

Canada lynx live in subalpine-coniferous forests. Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. Early successional stages of forests provide habitat for the lynx's primary prey, the snowshoe hare. Lynx are found in high elevation areas with deep snow where lynx have a competitive advantage over other predators. Fire suppression has allowed forests to mature, thereby reducing the mosaic habitat pattern needed by Canada lynx. They are capable of moving extremely long distances in search of food; the range of a lynx can include 94 square miles or more.

The U.S. Fish and Wildlife Service currently cites some forestry practices, such as pre-commercial thinning, and habitat connectivity as potential threats to lynx. The level of threat in both of these areas of concern is stated as “low”. The habitat connectivity threat relates to regional scale problems associated with urban and agricultural development, highways, and other land use changes that may block movement among isolated habitats. The main potential threat of concern within the analysis area is forestry practices.

Lynx were fairly common historically in the Wyoming Range as late as the early 1970’s, but only a small breeding population may persist today. This former abundance may have been due to the trailing effects of the timber harvest that occurred during the “tie hack” era on the Piney front and other areas. This widespread cutting would have left a mix of live and dead residual trees, large quantities of coarse woody debris, and extensive areas of dense conifer regeneration. This improved habitat for snowshoe hares, and lynx numbers likely responded to the increased forage base. The only documented recent reproduction of lynx in Wyoming has been in the Wyoming Range directly east of the project area (Squires and Laurion 2000).

Habitat and the snowshoe hare numbers in the assessment area may be marginally adequate to support lynx, especially in the higher, more remote parts. Tracks and observations have been recorded in the Greys River watershed (WGFD WOS). However, average snowshoe hare numbers this far south approximate the low end of the ten-year population cycle in the north, when the trailing lynx population often crashes. Although old, multi-storied forests in this area do produce snowshoe hares, some areas of more productive early seral forest may be needed for lynx to persist in this area. Wildfire, prescribed fire, and timber harvest may play a role in maintaining snowshoe hares and lynx.

In order for timber harvest to have a positive effect, final harvest treatments will have to produce structurally complex stands with coarse woody debris and extensive patches of dense regeneration of mixed tree species. Retention of the aspen type, especially regeneration treatments resulting in dense stands, will also help.

Grizzly bear

Optimum grizzly bear habitat consists of large areas with diverse vegetative communities free

from human disturbance. White bark pine nuts are an important fall food source. Ungulate winter ranges, which provide carrion and elk calves, are important springtime food sources.

Regionally, primary threats are habitat alteration and loss; and conflicts and displacement effects due to increased motorized access. Increased access increases human-bear contacts, some of which result in destruction of bears. Alien species, such as white pine blister rust and lake trout, threaten food resources in some areas. The grizzly bear population in the analysis area is limited by their predisposition to preying on domestic sheep and subsequently being killed. Such an occurrence took place in the analysis area in 2002.
However, at low population densities and due to individual variation in habits, a small number of grizzlies might persist in the vicinity of areas occupied by domestic sheep.

The designated grizzly bear recovery area is more than 40 miles north of the assessment area, while the southern extent of currently occupied grizzly bear range is within the Gros Ventre Wilderness. There have been unverified reports of female grizzlies with cubs within the analysis area. However, most bears that may appear can be expected to be young males just setting out on their own to establish a home range in unoccupied territory, such as the one killed in 2002. The young males are known to travel long distances and sometimes appear in places where grizzlies have been absent for a long time.

Experimental

Gray Wolf

Although listed as Endangered, wolves within Wyoming come under the experimental population clause of the Endangered Species Act, which provides greater management flexibility. The Forest Service must analyze impacts to wolves along with other wildlife populations when complying with National Environmental Policy Act requirements. Wolves are habitat generalists; large areas isolated from human disturbance and available prey are the primary characteristics of suitable wolf habitat.

Wolves were exterminated from most of their historic range through poisoning, trapping, and reduction in prey populations. Extermination of the species was government policy at one time. Populations today are most threatened by direct human-caused mortality and habitat loss.

Gray wolves were present historically, and the habitat is still suitable for them. Wolves continue to increase in numbers and expand their range in western Wyoming. Early in 2004, a number of wolf kills of elk were noted on the Greys River District, including some within the analysis area. Long, linear foothill zones, mountain fronts, and major drainages tend to channel wolf movements across the landscape. Winter concentrations of ungulates, such as winter feed grounds, are very likely to attract wolves.

Sensitive Species

Sensitive species are managed under the authority of the National Forest Management Act (PL 94-588). They are administratively designated by the Regional Forester (FSM 2670.5) as species for which population viability is a concern.

Table 2.19. Sensitive species status in the Greys River watershed

SPECIES	STATUS
Amphibians	
Columbia spotted frog (*Rana luteiventris)*	present
Birds	
boreal owl (*Aegolius funereus)*	present
common loon (*Gavia immer)*	seasonally present
flammulated owl (*Otus flammeolus)*	present
great gray owl (*Strix nebulosa)*	present
harlequin duck (*Histrionicus histrionicus)*	likely not present
northern goshawk (*Accipiter gentilis)*	present
peregrine falcon (*Falco peregrinus anatum*)	likely present
three-toed woodpecker *(Picoides tridactylus)*	present
trumpeter swan (*Cygnus buccinator)*	seasonally present
greater sage grouse *(Centrocercus urophasianus)*	not present
Fish	
Bonneville cutthroat trout (*Onchorhynchus clarki utah*)	not present
Colorado cutthroat trout (*Onchorhynchus clarki pleuriticus*)	not present
Snake River fine spotted cutthroat trout (*Oncorhynchus clarki* spp.)	present
Mammals	
fisher (*Martes pennanti)*	likely not present
spotted bat (*Euderma maculatum)*	not present
western big-eared bat (*Plecotus townsendii)*	not present
wolverine (*Gulo gulo)*	likely present
Plants	
black and purple sedge (*Carex luzulina var. atropurpurea*)	not present
creeping twinpod (*Physaria integrifolia var. monticola*)	not present
Greenland primrose (*Primula egaliksensis*)	not present
meadow milkvetch (*Astragalus diversifolius var. diversifolius*)	not present
naked-stemmed parrya (*Parrya nudicaulis*)	not present
narrowleaf goldenweed (*Haplopappus macronema var. linearis*)	not present
Payson's bladderpod (*Lesquerella paysonii*)	present
Payson's milkvetch (*Astragalus paysonii*)	present
pink agoseris (*Agoseris lackschewitzii*)	not present
rockcress draba (*Draba densifolia var. apiculata*)	not present
seaside sedge (*Carex incurviformis*)	not present
soft aster (*Aster mollis*)	not present
Starveling milkvetch (*Astragalus jejunus var. jejunus*)	not present
sweet-flowered rock jasmine (*Androsace chamaejasme ssp. carinata*)	not present
Weber's saussurea (*Saussurea weberi*)	not present
wooly daisy (*Erigeron lanatus*)	not present
Wyoming tansymustard (*Descurainia torulosa*)	not present

Boreal owl

Within the Intermountain Region, it appears the boreal owl occurs in low-density, isolated populations. Boreal owls are closely associated with high elevation spruce-fir forests, which they use year-round for foraging (Hayward and Verner 1994). A 1994 study, in the Greys River drainage, found all boreal owls were above 2,100 meters in elevation (Clark 1994). Nest stands contain a high density of large trees, with an open understory and a multi-layered canopy. Cavities excavated by woodpeckers are commonly used for nesting. Although they will use forest edges, boreal owls avoid open areas, such as open meadows and clear cuts. They may migrate elevationally in winter, moving to lower elevation conifer forests.

The predominant threat to boreal owls can be indirect effects of forest harvesting practices; harvesting may reduce primary prey populations, remove forest structure used for foraging, and eliminate nesting cavities. However, much of the high elevation spruce-fir forest in the analysis area is on sites not suitable for timber production, inaccessible, or in land use allocations that do not allow timber harvest. Within the potentially "suitable" timber base, subalpine fir is generally not considered merchantable. Also, old spruce-fir stands with complex structure will typically be reserved for a number of species that use that kind of habitat, including lynx and pine marten. Overall age class structure in the analysis area is heavily skewed towards old forest. Due to these reasons, potential timber harvest effects on the boreal owl population in the analysis area are likely minimal.

The boreal owl is quite common in the drainage. Several boreal owl sightings and one nest site were located in 1992 and 1993 during an intensive owl study and inventory (Clark 1994). Boreal owls have been located during almost all owl inventories conducted within proposed timber sales from 1994 to 1998. Boreal owls are expected to occur dispersed throughout the high elevation forests within the assessment area. Nest boxes were installed along the Greys River Road and side roads in 1998 to research boreal owl dispersal and population connectivity.

Columbia spotted frog

Columbia spotted frogs (*Rana luteiventris*) are most commonly found near permanent water such as ponds, lakes, springs, or slow streams (Patla 2000). They use the marshy edges, emergent vegetation, and algae for cover. They may move considerable distances from water after breeding, frequenting moist areas in conifer forests, grasslands, and shrublands. Spotted frogs are thought to hibernate near springs or other areas where water is unfrozen and constantly renewed.

Spotted frogs have experienced sharp population declines in parts of their range; including localized declines in parts of northwestern Wyoming (Patla 2000). They may be susceptible to habitat fragmentation if disturbances occur between breeding pools and hibernation sites; roads may fragment habitat, altering use and dispersal patterns (Gomez 1994). Fish stocking in lakes that previously supported no fish may affect spotted frog breeding (Patla 2000).

Common loon

Common loons (*Gavia immer*) breed on large lakes greater than 9 acres. Lakes need to be large enough to provide a runway for flight, deep enough to sustain fish, and clear for prey visibility.

Loons are sensitive to disturbance; their nests can easily be flooded by boat wakes or heavy wave action. They prefer protected areas with emergent vegetation for nesting. They migrate to coastal areas for the winter.

Loons are susceptible to human disturbance and fluctuating water levels on breeding lakes; they also may be jeopardized in some areas by predators (WNDD).

Loons have been observed near the larger, high elevation lakes (such as Corral Creek Lake), and during migration at the Greys River mouth. Breeding activity has not been documented within the assessment area.

Fisher

Fishers (*Martes pennanti*) are rare forest carnivores that prefer continuous forest cover, particularly mature to old growth spruce-fir forests with high canopy closure. They generally avoid open areas such as meadows, grasslands, and clear cuts. Fisher distribution may be limited by snow depth (Spahr et al. 1991). Unlike pine marten, fishers are not adapted to deep, soft snow. Forests with a dense understory of young conifers, shrubs, or herbaceous cover are important during summer. Riparian corridors receive greater use by the species compared to drier upland sites.

Fishers can be threatened by forest fragmentation and loss of mature forest. They appear to be tolerant of human activities if not accompanied by habitat alteration. Fishers are readily attracted to carrion or bait, and would have been readily susceptible to historical unregulated predator poisoning and trapping prior to the establishment of wildlife conservation measures.

The WGFD wildlife observation systems database does not contain any fisher sightings nor have there been any formal surveys. The status of the species in the analysis area is undetermined, but if present, the animal is very rare at this time. Dramatic increases in fisher populations have occurred in other regions of the country after reintroductions or periods of protection. The species will thrive and become common where habitat is suitable.

Flammulated owl

Flammulated owls (*Otus flammeolus*) favor mature ponderosa and mixed pine forests, with open canopies and an abundance of nocturnal insects (Hayward and Verner 1994). Aspen stands and second growth pine forests are also used. Flammulated owls avoid young dense pine stands where foraging is difficult. Large diameter snags greater than 20 inches DBH, with cavities, are important for nesting. Dependence on cavities for nesting and avoidance of cutover areas suggest flammulated owls may be affected by timber harvest. Preying primarily on insects, flammulated owls migrate to Central America for the winter.

Clearcutting and cutting of mature trees may impact flammulated owl habitat (Spahr et al. 1991). Thinning of dense, overstocked Douglas fir stands might provide stand structure preferred by the species. They are relatively tolerant of nondestructive intrusion.

Although considered to be out of their normal range by some sources (WNDD), flammulated owls are present within the assessment area. They have been observed in the area infrequently.

Great gray owl

Great gray owls (*Strix nebulosa*) are generally uncommon throughout their range. The analysis area is approaching the southern extremity of their range. Semi-open areas, where small rodents are abundant, near dense coniferous forest for roosting and nesting, are optimum habitat for great grays. Great grays rely on old hawk and raven nests; large diameter, broken-topped snags or stumps; dwarf-mistletoe platforms or similar platforms for nest sites (Hayward and Verner 1994). During winter some birds stay near their breeding territories while others make irregular movements in search of more favorable foraging conditions.

Habitat loss through logging of mature forest and overgrazing of meadows can cause population declines (WNDD). However, because the species uses habitats at successional extremes (old forest for nesting and young forest or meadows for foraging), forest management can be adapted to maintain or enhance conditions for the species. Poisoning of pocket gophers in post-harvest units can reduce prey populations and may result in secondary poisoning of owls.

Several sightings were reported in the upper part of the drainage during an intensive owl study and inventory in 1992 and 1993 (Clark 1994). Within the assessment area, great grays are associated primarily with lodgepole pine, Douglas fir, and aspen communities and adjacent open areas.

Harlequin duck

Low gradient, meandering mountain streams with dense shrubby riparian areas and woody debris describe harlequin duck (*Histrionicus histrionicus*) breeding habitat. Specific requirements include stream gradients less than 3 degrees, more than 3 loafing sites (mid-stream boulders or log jams) per 33 feet of stream, and greater than 50% streamside shrub cover. Harlequins winter on the Pacific coast, moving to the coast from September into November. They return to their breeding areas from late-April through mid-May (Spahr et al. 1991).

Harlequins can be threatened by habitat degradation including: destruction of riparian areas; destruction of watershed stability and stream flow regimes; impoundments and diversions on breeding streams; destruction of food base; and disturbance by recreational river users and hikers in breeding areas (Spahr et al. 1991). Harlequins appear very intolerant of disturbance, particularly boating on narrow streams during the breeding period. Very few areas with high human use maintain breeding populations (WNDD).

Harlequin ducks may migrate through the Greys River area, but are likely not resident. The WGFD WOS system contains two sightings, the most recent being in June 1995.

Northern goshawk

Goshawks use a variety of forest types, ages, structural conditions, and successional stages over a large area while foraging. Nesting habitats are more restrictive. Nests are typically located in structurally diverse, mature, and older forests, greater than 20 acres in size, low on gentle to moderate slopes (0-30%) with northerly aspects (Hayward and Escano 1989, Patla 1997, Reynolds et al. 1992). Nests are generally located in a stand that is taller and has greater basal area than the surrounding stands (Patla 1997). In the nearby Targhee National Forest, Douglas fir and lodgepole

pine were the most common nest tree species but aspen and spruce were also used.

Loss or degradation of habitat can occur with logging, which results in young-structured forests and habitat fragmentation. Retention of the aspen type is beneficial for the species. Thinning of dense, overstocked Douglas fir stands may improve foraging habitat and facilitate hunting. Goshawks are generally tolerant of nondestructive intrusion but are sensitive to nest site disturbance.

Infrequent sightings occur throughout the drainage. However, due to their naturally low population density, the species tends to go undetected. Documented sightings were near Meadows Guard Station in 1992, in Lookout Creek in 1997, and Mink Creek, 1998. One nest site was documented in 1992 about one mile north of the McCain Guard Station.

Potential goshawk nesting habitat was modeled using a geographic information system. Factors modeled were mature forested vegetation, northerly aspects between 270 and 90 degrees, and slope less than 30 percent (Figure Wildlife 4). The vegetation data are from 1988 stand level information used in the BTNF Land and Resource Management Plan (BTNF 1990). Aspects and slopes were derived from U.S.G.S. digital elevation models. Slope appears to be the limiting factor. Much of the potential habitat identified was low on slopes near stream courses; this is consistent with published habitat descriptions (Hayward and Escano 1989, Patla 1997, Reynolds et al. 1992). Models use factors believed to be important for determining habitat selection, but may not accurately reflect the preferences of all goshawks. Table 2.20 provides acreages by potential habitat suitability.

Table 2.20. Nesting Habitat Summary

Nesting Habitat Factors	Acres
Forested vegetation	210,068
Forested plus north aspect	135,593
Forested plus slope < 30%	112,924
Forested plus aspect & slope	57,826

Peregrine falcon

Statewide recovery goals were met in 1995. Greater Yellowstone and national recovery goals have also been reached, and the peregrine was removed from the Endangered Species list in August 1999. The falcon's status will be monitored for a minimum of five years from the delisting date, as required by the ESA.

Peregrines nest high on cliff ledges often near water because of the abundance of avian prey associated with such sites. Nests are generally located below 8,500 feet. Alternate nests may be used from one year to another. Peregrines may forage up to 20 kilometers from the nest site, but normally stay within 12 kilometers. Their prey consists almost entirely of birds, which are usually taken on the wing. Feeding habitat includes wetlands, riparian gorges, mountain valleys, and lakes, which support good populations of small to medium-sized terrestrial birds, shorebirds, and waterfowl. Peregrines migrate to Central America or the southwestern United States for the winter,

unless sufficient prey is available within their breeding territory.

Historic threats include falconers robbing nests, shooting by hunters, and food chain contamination from pesticides. The decline and subsequent recovery of the species coincided with the prohibition against the use of DDT. Other environmental contaminants have recently been detected in the species, but the impacts are not yet determined. However, in most areas, factors other than contaminants no longer threaten falcon survival. Human activity, e.g. rock climbing, near breeding sites may cause nest abandonment. Falcons appear tolerant of nondestructive intrusion.

Peregrine falcons nest along Star Valley front in the vicinity of Etna. Although a historic nest site has not been used in recent years, WGFD located a new nesting cliff in 2004 that successfully fledged two young. Cliff sites within the assessment area are probably suitable for nesting; and the WGFD believes it is likely that breeding peregrines are present. In 2004, WGFD surveyed potential cliffs in the lower end of the Grey's River west of Squaw Creek and found one active Golden Eagle eyrie. There have not been any large-scale breeding surveys conducted in the Greys River drainage.

Spotted bat

Spotted bats (*Euderma maculatum*) use a variety of habitats for foraging, including open conifer forests, shrublands, and open fields. Suitable roosting sites may be the limiting habitat factor. Narrow crevices high on steep limestone or sandstone cliffs appear to be critical. Spotted bats are highly territorial, avoiding each other while foraging and roosting alone.

Roosting habitat within the assessment area is probably limited. There are no historical records and a 1991 survey was unable to locate any spotted bats (Garber 1991). Spotted bats are not believed to be present.

Three-toed woodpecker

Three-toed woodpecker (*Picoides tridactylus*) densities are very low, and there is little population information available. They require snags in conifer forests for feeding, nesting, perching, and roosting. They are usually found below 9,000 feet elevation. Fire-killed trees and older conifers are important foraging sites.

Dependence upon snags for feeding, nesting, and roosting leaves three-toed woodpeckers potentially vulnerable to the effects of clearcutting and firewood gathering. For maximum population levels in actively managed areas, snags with DBH of 12-16 inches and heights of 19.6-39.4 feet should be retained at a density of 42-52 snags per 100 acres and in clumps rather than individual snags (Spahr et al. 1991). Overall, current stand age class distribution in the analysis area is skewed towards the old forest. Wildfire potential is increasing and large fires appear to becoming more common. These trends are favorable for the species.

Three-toed woodpeckers are present within the assessment area; they have been observed feeding in several locations. No formal surveys have been conducted.

Townsend's big-eared bat

Townsend's big-eared bats (*Plecotus townsendii*) are also referred to as the western big-eared bat. A variety of habitat types are used, including conifer forest, shrublands, and meadows. During winter they hibernate singly or in small clusters in caves, mine shafts, rocky outcrops, and occasionally in abandoned buildings. The bats are sensitive to human disturbance and will abandon a roost site if disturbed. Low reproductive rates and limited roost sites make this species vulnerable.

There are not any documented sightings or roost sites within the assessment area (Garber 1991). Townsend's big-eared bats are not known to be present.

Trumpeter swan

Trumpeter swan (*Cygnus buccinator*) nesting habitat consists of marshes, lakes, beaver ponds, and backwaters of rivers. They prefer quiet, shallow water with dense aquatic plant and invertebrate growth. Emergent vegetation is essential for cover. Nonbreeding swans gather in flocks on large lakes and reservoirs during the summer. In winter, swans need areas with plentiful aquatic vegetation that remain ice-free.

The Rocky Mountain swan population is threatened by declining winter habitat, overcrowding on existing winter habitat, and the potential for widespread disease introduction (WNDD). Human activity near nest sites may cause nest failure.

There is a resident breeding population in the Greater Yellowstone Area. The Greater Yellowstone swans remain within the tri-state area during the winter. Additional breeding pairs are being released in the Upper Green River drainage with the expectation that these swans will migrate to more suitable winter habitat.

There are not any trumpeter swan records for the Greys River watershed in the WGFD WOS. A few swans reside year-round in Star Valley and Jackson Hole. Jackson Hole and surrounding areas support a sizable winter population of swans, including both residents and Canadian migrants. The nearest pair of nesting trumpeter swans to the project area is adjacent to the Salt River about one mile south of the Alpine Wetlands (WGFD records). Due to management efforts to expand the population range in the 1980's, currently up to 100 swans now winter in the Salt River drainage. In spring and fall, swans migrate along the Snake River corridor past the mouth of the Greys River and may occasionally use the lower reaches of the Greys for resting and foraging.

Management concerns and objectives for this species can also be found in the 1998 Pacific Flyway Management Plan for the Rocky Mountain Population (RMP) and the 2002 Trumpeter Swan Implementation Plan (TSIP).

Wolverine

Wolverines (*Gulo gulo*) are considered to be scarce or rare within the Intermountain Region. It is essentially a wilderness animal, requiring large tracts with diverse vegetative communities; they travel extensively, and typically travel alone. Wolverines generally summer at higher elevations, moving to lower elevations during the winter, with riparian areas possibly being an important

winter habitat. They appear to prefer hunting around small meadows, in timber, along cliffs, and in riparian and ecotonal areas. They apparently avoid large open areas such as parks, meadows, and clear cuts.

Wolverine presence in the analysis area has recently been documented by a radio-collared animal. There have been unconfirmed sightings in recent years. The WGFD wildlife observations systems database contains three wolverine records for the assessment area, the most recent being in 1990.

Greater Sage Grouse
This recent addition to the Intermountain Sensitive species list is not present in the analysis area. Potential habitat does not exist in the upper Greys River drainage.

Ecological and Management Indicator Species (MIS)

Ecological indicator species represent species narrowly restricted to a key habitat and species with important requirements provided by a key habitat. Key habitats are those likely to be significantly affected by National Forest management. The Forest Plan (USDA Forest Service, 1987) identified these habitats. At present time the Bridger-Teton National Forest's MIS list is being revised in order to focus on species that are effective indicators and also readily monitored.

Other Species

Approximately 50 non-game mammals occur within the assessment area. Most of these species can be expected to utilize the assessment area at least during part of their life cycle. A variety of furbearers, small game or otherwise socially-important animals are common in the assessment area. Some of these species include coyote (*Canis latrans*), porcupine (*Erethizon dorsatum*), bobcat (*Lynx rufus*), beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*). The river otter (*Lutra canadensis*) is rarely seen, but present in apparently small numbers. The raccoon (*Procyon lotor*) and red fox (*Vulpes vulpes*) have expanded their range into this drainage, and are now quite common. The snowshoe hare (*Lepus americanus*) is quite common throughout the area. Hares serve as an important prey species for predators and are hunted as well.

Blue grouse (*Dendragapus obscurus*) and ruffed grouse (*Bonasa umbellus*) are both common game birds. Other game species present include sandhill crane (*Grus canadensis*), and a variety of waterfowl. Approximately 150 non-game birds use the assessment area during part of the year. Some common birds include raven (*Corvus corax*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), golden eagle (*Aquila chrysaetos*), northern harrier (*Circus cyaneus*), great horned owl (*Bubo virginianus*), saw-whet owl (*Aegolius acadicus*), Clark's nutcracker (*Nucifraga columbiana*), Stellar's jay (*Cyanocitta cristata*), great blue heron (*Ardea herodias*), and belted kingfisher (*Ceryle alcyon*). Numerous species of sparrows, woodpeckers, wrens, warblers, finches, blackbirds, thrushes, flycatchers, jays, hummingbirds, owls, hawks, ducks, etc. migrate into and through the drainage at various times of the year.

Sensitive Plants

The Regional Forester identifies sensitive species for which population viability is a concern due to downward trends in population or habitat capability. The Endangered Species Act requires protection of sensitive species to reduce the need for Federal listing.

Sensitive plants (Table 3) documented to be present within the Greys River watershed by the WYNDD include Payson's bladderpod, and Payson's milkvetch.

Payson's bladderpod
Limestone outcrops with scant soil development and little competition from other plants is the preferred habitat for Payson's bladderpod. It may be sensitive to climatic conditions; Fertig (1997) suggested populations may change noticeably on an annual basis, according to weather conditions (WNDD 2000). Low elevation populations may be impacted from development, recreation, and grazing. Overall, threats are considered low to most populations (WNDD 2000)

This plant has been identified in several locations through the Greys River watershed, following a stratum of limestone outcrop that outlines the Salt River Range and the Grayback Ridge (Shultz and Shultz 1979).

Payson's milkvetch
Payson's milkvetch inhabits disturbed areas on sandy soils from 6,700 to 9,600 feet in elevation (Spahr et. al. 1991). It is shade intolerant, and most commonly found along forest edges and openings, roadsides, and lakeshores. Plant numbers decrease as the canopy density increases. It flowers from June through August and fruits from July to October. An early pioneering species, it disappears a few years after initial vegetation disturbance. Elimination of fire, timber harvest, and other disturbances result in population declines and may eliminate Payson's milkvetch habitat (Spahr et al. 1991). Periodic disturbances are necessary for the long-term survival of the species.

There are several populations within the Greys and Little Greys drainages (Shultz and Shultz 1979, WYNDD).

Transportation System

Overview
An inventory completed in 1998 of known and identifiable roads shows a total of 379.9 miles of roads in the drainage. Of these, 216.6 miles (57%) are open to motorized vehicle travel, 100.6 miles (27%) are presently closed to vehicle travel, and 62.7 miles (16%) have seasonal closures in the fall through spring for wildlife security and resource protection purposes. They are listed by Road Number, Name and basic descriptors in Appendix F.

With a few exceptions (coal mining, oil and gas exploratory wells), the 379.9 miles of existing roads (including the Greys River Road) were constructed to access areas for timber harvest. While some of those roads continue to be used for this purpose, along with providing access for recreation, many of them were basically left "as is" after the harvest was completed. No attempts were made to reclaim, drain, or maintain them. This has caused some problems with soil erosion, sediment movement, and noxious weed invasion in some places, impacted wildlife habitat in some areas, and provided opportunities for recreational travel routes in other places. The existing road

system is being inventoried, management objectives are being developed for roads which are needed for future access, and rehabilitation plans implemented for those which no longer serve a viable purpose. Specific problem areas include the Greys River Road at Box Canyon Creek, where the road is in a riparian area. The entire road above Forest Park needs to be reconstructed to bring it up to standard. Shot Hole Springs, East Fork, and Poison Creek Bridges have been identified as being deficient and need to be replaced.

Road Densities
Road densities have not been calculated for most of the watershed, but they have been calculated for Shale Creek and the Black - Bug timber sale area (two of the more heavily roaded areas in the watershed) and they did not exceed road density standards. Other areas and drainages are completely unroaded.

Recreation

General Recreation Attributes and Resource Assets

What makes the Greys River area special? What distinguishes it from similar plan implementation areas on the forest or on adjacent forests? These are the assets that we seek to enhance or preserve when formulating desired conditions and actions needed to meet them. Some of the most significant recreation and scenic attributes of the LSA area are these:

- Greys River, sixty miles long, is the longest undammed river in Wyoming outside of Yellowstone National Park. It is also the fastest growing river in Wyoming, increasing its volume greatly from source to mouth.

- Greys River is a potential addition to the National Wild and Scenic Rivers System, with identified outstandingly remarkable values of scenery, recreation, and wildlife. Other streams in the LSA area found eligible for Wild, Scenic, or Recreational Rivers include the Little Greys River and Box Canyon and Marten Creeks.

- Tri-Basin Divide is a regional landmark, where the Greys River, Smiths Fork, and LaBarge Creek drainages meet. The divide drains water into the Columbia River, the Colorado River, and the Great Basin.

- The Wyoming Range National Recreation Trail follows the crest of the range for 75 miles.

- Wildlife, particularly big game, is a major attraction and attribute of this watershed. Elk, mule deer, moose, and a variety of small mammals and birds are present in significant numbers.

- An all-weather road gives access to the Greys River corridor, with numerous developed and undeveloped campsites along the road. Proximity to large population centers in the region and the ease of access contribute to high summer and fall recreation use. The

high quality of the scenery and recreation setting, as well as regionally significant hunting and fishing opportunities, contribute to use that is national in scope.

- The area considered in this document has distinctive scenic character, with a high degree of visual variety, outstanding views of distant mountains, and a foreground that includes water and various vegetation features. Steep mountainsides, waterfalls, and diverse vegetation contribute to the scenic quality. The lower Greys River has one of the most extensive stands of bigtooth maple in the Bridger-Teton Forest; this attracts people seeking fall color in September. In addition to the maples there are aspen stands and various deciduous shrubs that make the drainage particularly attractive in the fall.

- Large areas of relatively undisturbed backcountry include large parts of the Wyoming and Salt River Ranges, Middle Ridge, and the range dividing the Snake River and Little Greys. The Grayback roadless area is the largest primitive setting on the forest (over 315,000 acres). A good trail system and many access points exist. Other high-quality backcountry (based on cohesive setting from bottom to head of drainages, scenic quality and undisturbed character of setting from ridge to ridge, and maintained trail system) include several drainages in the southern Salt River Range and on the west slope of the Wyoming Range.

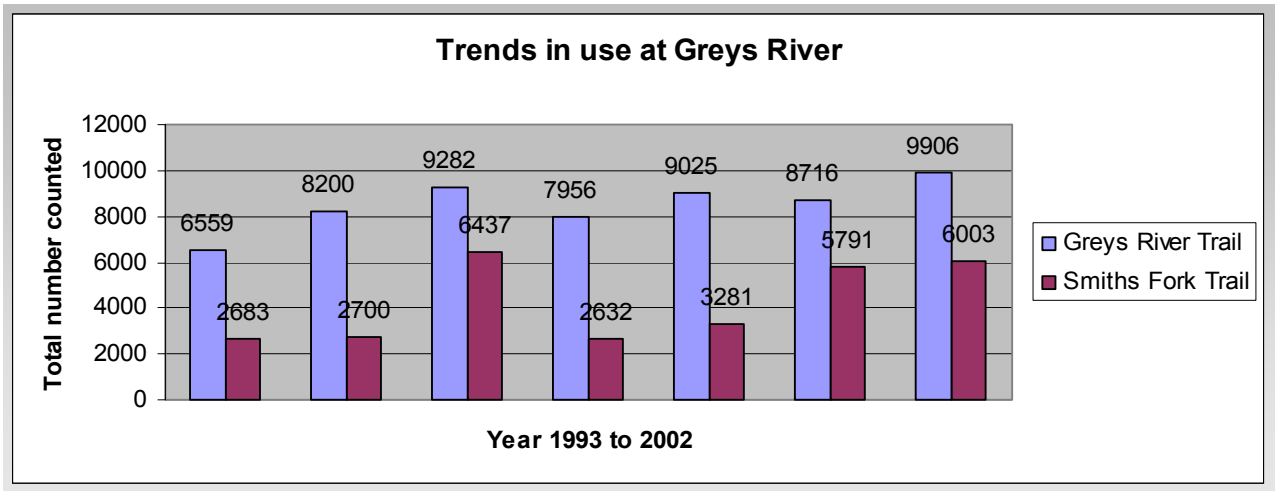
Bigtooth maple, lower Greys River

Trends in recreation use

Recreation use, both commercial guiding and individual visitation, is on the increase in all seasons. During the winter, we are seeing an increase in snowmobile use, especially at Alpine and Smiths Fork trailheads. Snowmobile rentals are increasing as well. On the Greys River snowmobile trail

our trail counter shows a 10-year rise in use, with some fluctuation.

Table 2.21 Snowmobile Use Trends



In summer and fall, the Greys River has been "discovered," especially by regional visitors who come year after year to fish, hunt for big game, and participate in family camping. The number and condition of dispersed roadside camps is one measure of increasing use; campground occupancy rates have not been very helpful in the past since many people don't use the developed campgrounds. Fall hunting use has fluctuated over the past decade in response to licenses issued by Wyoming Game and Fish Department. Average number of deer hunters per year in the hunt areas covering the Wyoming Range has been around 8600, with a success ratio of 60% (average). Average number of licensed elk hunters is 2400, with a success ratio of 37%.

Areas Not Managed for Recreation

- Forest Park feedground is closed to all winter uses.
- Roads to the Alpine water tanks and snow courses are closed to snowmobiles.
- Winter ranges such as the Greys River riparian zone, and the west slope of Middle Ridge from Little Elk Creek to the south facing slopes in Deadman Creek are not now closed to recreation uses, but this should be monitored and restrictions implemented if the use increases to the point that wintering game are being impacted.
- There are no closures to human presence anywhere in the watershed during summer and fall, but there are some road closures (such as the Porcupine--Little Elk loop) to protect elk calving areas.

Developed Recreation Facilities Current Condition and Needs

Existing developed campgrounds in the Greys River Corridor are shown below.

Name	PAOT Capacity	Overnight Use Fee	Distance From Alpine
Bridge	25	No	2 miles
Lynx Creek	70	No	12 miles
Murphy Creek	50	Yes	14 miles
Moose Flat	50	Yes	22 miles
Forest Park	60	Yes	34 miles

Bridge Campground has five units suitable for pickups with campers or tents; larger RVs can't negotiate the tight turns. There are outhouses, tables, and grills at each unit at Bridge Campground. The water system is not working. Bridge Campground has erosion problems on some units and has a tight radius for turning. In the early summer, most of the use in this site is for parking and take-out by kayakers. It is operated as a no-services, no fee site.

Lynx Creek Campground is located two miles north of Murphy Creek Campground, a larger and more desirable site. The water system is not operable and facilities are deteriorated. It is operated as a lower standard developed campground with no fees; it is close to trails in the Salt River Range and on Middle Ridge.

Murphy Creek Campground is a popular site and has facilities in good condition, including water system, toilets, and garbage service. Reconstructed in 1997, with new road, spurs, fencing, toilets, and other facilities. Attractions include fishing on the river and nearby Murphy Lake. It is a fee site, open from June to mid-September.

Murphy Lake Picnic site at Murphy Lake has been recently reconstructed to allow better traffic flow and boat launching. There are several parking stalls, a launch and turn-around area, a vault toilet, and picnic tables placed along the lake in walk-in sites.

Moose Flat Campground is located just north of The Elbow on the Greys River. Reconstructed in 1997, new road and spurs, toilet. The campground is near a number of trailheads; fishing on the Greys River is a primary attraction as well. This area offers spectacular views of the Salt River Range, with Man and Visser Peaks standing over three thousand feet above the river. The campground is open from June to mid-September, has all services, and is a fee site.

Forest Park Campground is located on Park Creek, about two miles south of the junction with Sheep Creek. The campground has all services and is a fee site open from June to mid-September. It does not get much use, possibly due to its distance up the Greys River road, and because it is not located on the river. The campground was reconstructed in 1997.

Visitor Information Facilities

Each of the campgrounds has a bulletin board at the fee station, where campground regulations, special orders and general information are displayed for those who enter the campground.

Information is also displayed on signs at other existing VIS facilities:

Mileage Marker	Name	Facility and/or Description
0.6S	Greys entrance	Information sign, interpretive sign, parking.
22.7W	Visser Peak	Interpretive sign, pull-off, picnic table
33.4W	Elk Feedground	Information and regulatory sign
34.9E	Elk Feedground	Information and regulatory sign
46.2W	Cazier GS	Interpretive sign about Ranger Cazier
51.2W	Shot Hole Spring	Interpretive sign

ROS Settings

The analysis area can be described in terms of the Recreation Opportunity Spectrum (ROS), from developed roaded areas to the remote backcountry. ROS classes and where they occur within the analysis area are described below. Map 2.3 on the following page displays existing settings.

Roaded ROS settings. These can be divided by development level and use, with different experiences available on varying standard roads. They include (1) corridors of high-standard roads have ready access to highways and settlements, with developed recreation sites and potential for more. Example: Greys River Road from Alpine to Forest Park Campground. (2) Forest roads in more remote areas, lower standard but still suitable for sedan traffic. Example: Little Greys River Road. (3) High-clearance roads in remote areas, with few or no developments. Camp areas and pull-offs are primitive. Example: Deadman Creek. (4) 4WD roads, transitional between roaded and semiprimitive motorized settings. No developments except primitive trailhead parking areas. Example: Upper Cabin Creek.

Map 2.3

The Greys River Road is double- lane standard with a gravel surface for the lower 35 miles. Magnesium chloride for dust abatement has been placed along the road near campgrounds in past years; this helps a great deal and needs to be replaced annually. The entire lower 35 miles was treated with dust abatement in 2001 and 2002 which greatly enhanced the safety and recreational experience of those using the road. Most years, the road is graded in early summer and again in fall; in between, the heavy traffic from recreation vehicles, logging trucks, and livestock trucks create dust and washboards. The upper 10 miles of the road is narrow, winding next to the Greys River in a steep gorge. The road narrows to one lane with numerous blind corners.

Other graveled roads suitable for most vehicles include the Sheep Creek Road to McDougal Gap, giving access to crest of the Wyoming Range and a through route to the upper Green River; the Little Greys River Road and branch road to McCain Guard Station; Murphy Creek Road with the popular day-use area at Murphy Lake; and Blind Bull Creek road which gives roaded access to the Wyoming Range crest. Current condition of the road is generally good but narrow and in several locations the roadbeds are slumping.

At a somewhat lower standard are several roads that require higher clearance for vehicles to pass, but are not necessarily 4WD routes. These roads serve dispersed camping areas and pull-offs for hiking and fishing. Included are Deadman Creek, lower White Creek (gated about a mile from junction), Porcupine/Little Elk Creek, Shale-Kinney Creek loop, lower end of Bear and Elk Creeks, North Three Forks Creek, lower Ridge Creek, lower Squaw Creek, and the lower segments of many logging roads that have gates placed farther up the road.

4WD roads, transitional between RN and SPM settings are characterized by low development level; the only developments that are found here are primitive trailhead parking at the end of some roads and some established camps, including outfitter camps. For example, some of the roads in the East Fork of the Greys River, Poison Meadows, Boco and Shale Creeks, lower Corral Creek, Upper Cabin Creek, and other logging roads that have remained open for vehicle traffic. Depending on weather and level of road maintenance, many of the roads listed as 2WD routes may not be.

Semi-Primitive, Motorized Settings (SPM)
Semi-primitive, motorized areas in backcountry are mostly restricted to designated routes due to steep topography. Many of the routes currently open to trail vehicles are suitable for expert riders only. Suitability factors for SPM settings include (1) high scenic quality, (2) low use levels and little evidence of human activity (though distant views of management such as timber harvest are acceptable), (3) shorter, easier routes than in primitive settings, with closer destinations, although the areas are still fairly large, (4) opportunities for compatible recreation uses, and (5) a trail system that is well designed and maintained for those uses. Trail maintenance level, clearing width, and drainage structures are needed to provide opportunities for wheeled vehicles. None of the currently open SPM trails in the Greys River are designed or maintained for motorized trail vehicles, particularly the wider 4-wheelers. Existing SPM corridors and trails are listed below:

1. Squaw Creek loop into Murphy Creek. This loop had 2 miles rerouted by the WY State Trails Program crew in 2004 to eliminate some steep stretches that made it difficult to climb without

causing soil erosion.

2. Corral Creek trail, bottom 3 miles usable by 4-wheeled ATVs. Most of the trail is difficult for wheeled vehicles as there are several fords and steep sections.

3. Telephone Pass and Deadman Peak, access to Deadman Lookout. Used by ATVs and those parts that are open to 4WD pickups are also used by them.

4. Meadows Creek (Covey Cutoff trail). Lower end to connection with road system to the south is used by bikes and ATVs. Upper end of the trail, with tie-in to Strawberry Creek trail on west side of Salt River Range, is not well suited for wheeled vehicles due to steep stretches, cliff bands, and talus.

5. Lake Barstow. In 2003 the trail was relocated and improved to allow access by 4-wheeled trail vehicles to the lake.

6. Elk Mountain, open on the map to trail bikes but trail is very difficult with landslides, washouts and undermining of the trail tread. The Skull Creek Trail is hazardous to all uses; Trail Creek is in better shape.

7. Spring Creek trail to Way Trail. Fords required, but good trail. ATVs use lower section that used to be a road.

8. The Way Trail is a mid- to high-elevation route on the east slope of the Salt River Range. Although travel map shows this trail as open to motorized vehicles, many segments would require major reconstruction to be made suitable.

9. Other. Semi-Primitive motorized opportunities exist on some closed roads, including those in the East Fork of Greys River, the area between Spring and Clear Creeks, North Three Forks Creek, Elk and Bear Creeks, Squaw Creek, a network of roads originating in Cabin Creek, and others. These roads can provide routes for ATVs, mountain bikes, and trail bikes, as well as for foot and horse travel.

Semi-Primitive, Non-Motorized Settings
Factors that contribute to "high quality settings" include (1) high scenic quality, (2) relatively low use and little evidence of human activity (though distant views of management such as timber harvest are acceptable), (3) shorter, easier routes than in primitive settings, with closer destinations, although the areas are still fairly large, (4) opportunities for compatible recreation uses, and (5) a trail system that is well designed and maintained for those uses. The areas most suitable for semi-primitive backcountry management based on factors listed above include:

1. Bradley Mountain, Bailey Lake, and less remote parts of the Grayback Ridge.
2. Middle Ridge.
3. Other semi-primitive non-motorized areas in the watershed bordering the larger primitive areas described below.

Primitive settings
Within the watershed are large areas of remote backcountry. Some areas are connected to other large primitive settings beyond the watershed boundary. "Quality" of the setting, or suitability of an area to be managed for primitive backcountry, has been described in terms of factors that contribute to the Primitive ROS setting, including (1) large size OR a cohesive setting from bottom to head of a watershed, (2) scenic quality--high level of visual variety and presence of special features and attractions, (3) undisturbed character and little to no evidence of disturbance to the natural setting, (4) opportunities for recreation activities compatible with the primitive setting, (5) access that facilitates recreation uses, including trailheads and a maintained trail system, and (6) a high degree of challenge and opportunity for solitude. The primitive backcountry in the Greys River watershed offers considerably more solitude than many areas in classified wilderness. The areas most suitable for primitive backcountry management based on factors listed above include the following:

1. Salt River Range between Bear and Corral Creeks, contiguous with Salt River front. Upper elevations of Bear, Elk and Three Forks Creeks; entire drainages of Rock, Crow, and North Corral Creeks.
2. Salt River Range, Corral Creek to Sheep Pass, contiguous with Mt. Wagner area. Includes Willow, Dick, and Spring Creeks.
3. Parts of the Grayback roadless area, most of which is on adjacent districts. Within the Greys River watershed, this includes the upper end of the Little Greys River, North Fork of Sheep Creek, and the Mt. McDougal area. The Grayback area is the largest primitive setting on the forest outside of Wilderness. A good trail system and many access points exist.

Other primitive areas are found on the Wyoming Range crest (most of the corridor of the National Recreation Trail from McDougal Gap to Wyoming Peak) and the northern Salt River Range.

Existing mix of summer/fall ROS settings, Greys River watershed:

- Primitive: 80,000 acres, 28% of analysis area.
- Semi-primitive, non-motorized: 88,000 acres, 30% of analysis area.
- Semi-primitive, motorized: 11,000 acres, 4% of analysis area (mostly narrow corridors and individual trails).
- Roaded: 111,000 acres, 38% of area (corridors around open roads.

Winter settings
Except for a few winter range closures, the entire watershed is managed as semi-primitive motorized and open to snowmobile use. The setting can be divided according to development level and access, as follows.

1. Frequently groomed, heavy-use trails: Alpine to Box Y on Greys River.
2. Regularly groomed trails, well marked and well used: Blind Bull, Little Greys, Smiths Fork trails.
3. Backcountry areas, with marked trails in some places, but with infrequent (or no) trail

grooming and lighter use: Squaw-Murphy trail, Poison Meadows, upper end of Greys River, Bull Hollow, and the southern Salt River Range.

4. Areas with winter range closures: Greys River and Forest Park elk feedgrounds.

These categories correspond to those identified for the Greater Yellowstone area winter use study (1999), for which winter ROS classes were labeled "potential opportunity areas."

Dispersed Recreation Facilities

Established roadside campsites

A summary of conditions at established roadside camps (from 1993 inventory data):

Vehicle access. Of 115 campsites in the inventory, most are accessed via a single two-track road. Only 17 had two or more roads with significant loss of vegetation and soil damage.

Camp and road location. Most are at least 50 feet from the water's edge; 16 are within 25 feet.

Loss of ground vegetation. Twenty-one camps had more than 500 square feet of vegetation loss; a few of these were considerably more.

Developments. User-built structures, some of them significant, are found at many camps; over half the sites inventoried include more than one fire ring, tables, meat racks, corrals, and other structures. Some of these are somewhat inconspicuous, but many detract from the scenic quality of the site. Wire, plastic twine, nails driven into trees, plastic tarps, and structures in a state of disrepair are regarded by other visitors as unsightly.

Site cleanliness. Many sites contain litter, particularly in or around the campfire ring. Much of the trash in camps is old, appearing to have been buried once.

Privacy. Most of the campsites in the river corridor offer privacy, being separated by sight from adjacent camps. Most also are at least partially screened from the road and at least 50 feet from it. Sixteen camps are within 50 feet of the road (these may be the same 16 that are within 25 feet of the river, ones located in narrow places between the river and the road).

Trailheads

There are 33 trailheads in the analysis area with existing or potential developments. Currently, six of them have some development, at least a surfaced parking area and signing. The remaining ones have been prioritized for future development (see table in the appendix), according to their needs for resource protection, demand for use, and the total amount of use each site currently receives. Many of these trailheads need little in the way of development, especially those that serve trails with low use in areas to be managed as primitive.

Primary Recreation Roads

The Greys River Road is the primary recreation road in the watershed, offering river access and many opportunities for roadside dispersed camping and day use. In contrast with nearby Palisades Reservoir and the Snake River Canyon, on paved highways with emphasis on developed

campgrounds and access to river/reservoir, the Greys River Road offers a more remote and rustic setting accessible to all vehicles except the largest RVs.

Based on level of use, condition of road, presence or absence of developed sites, remoteness, and number and use of dispersed sites, the Greys River Road can be divided into the following segments:

1. Forest boundary to Murphy Creek. Most used area, heavy traffic, much use by recreation vehicles and intermittent use by logging and livestock trucks. Recreation use includes camping, day use, large groups. The road is also used in winter as a groomed snowmobile trail.

2. Murphy Creek to Forest Park. Use by all types of traffic. Most of the developed campgrounds are in this segment. Sheep Creek gives access to Wyoming Range and east side via McDougal Gap. Most of the secondary recreation roads and opportunities for OHV use accessed via Greys River Road are found in this segment.

3. Forest Park to Kinney Creek. Considerably less commercial and recreational traffic than Segments 1 and 2. More primitive and remote, trail access to Salt River and Wyoming Ranges, numerous semi-developed and primitive roadside camps. Road used to access backcountry trails and for through traffic.

4. Kinney Creek to Tri-Basin Divide. Relatively low use but still accessible to most types of vehicles when the road is dry. One lane with many pullouts, currently lacking a good gravel surface. Considerable watershed concern in upper narrows where the native surface road is next to the river with no buffer.

Little Greys River Road. All types of traffic can drive this well-surfaced road. Currently there is low to moderate traffic volume and only occasional use by very large vehicles. Mostly two lanes with frequent pullouts, many trailhead and campsite access points.

Murphy Creek Road. Most of the road is drivable by sedans, though there are some steep pitches and places that tend to hold large puddles. Low to moderate traffic volume and rare use by very large vehicles (switchbacks are not suitable). Two lanes as far as Murphy Lake; one lane with turnouts beyond.

Deadman Creek Road. Light use by small vehicles beyond the sheep staging area. Access to trails, outfitter camps, historic coal mining area. Water often runs down this road and the upper end is getting rather rustic. Drainage ditches a few years ago helped the lower end of this road.

Little Elk - Porcupine Road. A durable high clearance road with light to moderate traffic, one lane with frequent pullouts. Seasonal closure to protect elk calving areas.

Blind Bull Road. Low to moderate traffic volume, suitable for smaller vehicles (dugway is narrow with no opportunity to create more pulloffs). Access to Wyoming Range crest, outfitter camp,

trailhead. Subject to slumping in wet years; road needs significant maintenance to stay open.

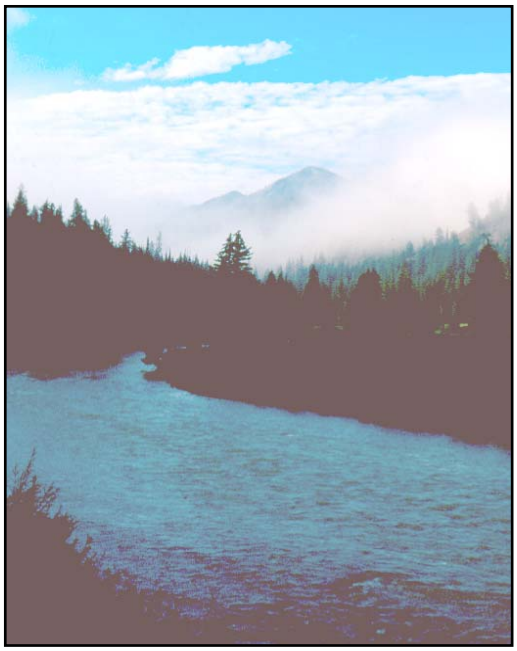
Bear Creek Road. Moderate traffic volume in lower end where there are several popular campsites. Access to camping, fishing, trailhead. Native cobble surface seems durable without gravel surface at current use level.

North Three Forks Road. Road can be wet with deep puddles and mud, and 4WD is sometimes necessary to access the Lake Barstow trailhead. Access to the lake, hunting areas.

Meadows Guard Station – Box Y access. Moderate traffic volume, occasional use by large vehicles. Condition of bridge not known. Meadow Creek Trailhead, Meadows Guard Station, and Box Y access.

McCain Meadows - Waterdog Lake access. Moderate traffic volume on a mostly good surfaced road, uppermost end near outfitter camp is a bit sketchy sometimes. One lane with pullouts. Main access to Big Springs Trail (to top of the Greyback), Bailey Lake, McCain Meadows and trails north of there, outfitter camp, popular camping spots and Big Dad Spring.

White Creek, Cabin Creek, Spring Creek, Stump Lake, Kinney Creek, Squaw Creek. These are all low-development roads that give access primarily to trailheads. Most are old logging roads that have been gated at some point, and have received little to no maintenance since. Cabin Creek, for example, is very rough and eroded, suitable for high clearance only. White Creek is full of springs and seeps, though it has had some improvement in recent years, mainly efforts to drain it and provide surfacing on the bad clay spots. Most of these roads connect with important backcountry trails, and they serve recreation vehicles, including some trucks pulling horse trailers.



Greys River at Lynx Creek

Trails and Recreation Routes

The numbers and use of off-highway vehicles, principally four-wheeled ATVs, have increased dramatically in the past few years. Following is a summary of trails open to vehicles ("availability") on the travel plan and a preliminary estimate of the suitability of those trails for four-wheelers and two-wheeled motorized trail bikes, as well as recommendations for changes. The summary in Table 2.22 underscores the need to revise the current travel plan.

Table 2.22 Gap between Motorized Availability and Suitability

Trail Name, no.	Miles Open on Travel Plan	Miles usable for Four-Wheelers	Miles usable for Two-Wheeled Bikes
Trail Fork, # 3037	0.5	0	0.5
Wyoming Peak 3041	4.6	0	4.6
Spring Creek 3042	4.5	1.3	4.5
Trail Creek 3069	3.6	0.9	3.6
Telephone Pass 3075	8.8	3.1	8.8
Deadman Peak 3076	4.5	0	0
Way Trail 3079	19.4	1.0	3.0
Covey Cutoff 3081	7.0	1.5	3.5
Bear Creek 3085	7.5	2.9	7.5
Lake Barstow 3088	1.5	1.0	1.5
Sheep Pass 3171	2.0	0	2.0
Corral Creek 3179	7.2	3.0	7.2
Murphy-Squaw 3183	6.8	6.8	6.8
Totals	**77.9**	**21.5**	**52.5**

Winter Routes

With the exception of the Forest Park Elk Feedground and an area near Alpine comprising a portion of the Greys River Winter Elk Pasture and Feedground, the entire drainage is open to snowmobile use. There are some conflicts between snowmobile use and wintering wildlife. To date, this conflict has not been considered as significant enough to warrant further restrictions. With the rapidly increasing snowmobile use that we have experienced in the past few years, perhaps this should be reviewed and analyzed to determine if restrictions are deemed necessary at this time.

Table 2.23 demonstrates snowmobile trails that exist currently in the drainage:

Table 2.23 Snowmobile Mileage and Maintenance Status

Trail Name	**Miles**	**Status**
Greys River (Lower)	28.0	Groomed several times per week
Greys River (Upper)	30.0	Groomed monthly
Alpine Detour	1.3	Groomed several times per week
Smiths Fork	2.0	Groomed weekly

Little Greys River	14.0	Groomed weekly
Blind Bull/Horse Creek	7.0	Groomed weekly
Squaw Creek	12.0	Marked, Part groomed occasionally
Bull Hollow	4.0	Marked, Not groomed

Inventoried Roadless Areas

In the Greys River watershed, parts of three inventoried roadless areas are found. They are listed on the table below.

Number	Name of area	Acreage*	Forest Plan DFCs
3002	Salt River Range	259,270	DFCs 1B, 10, 12, 2a with some 2b corridors.
3005	Southern Wyoming Range	76,191	DFCs 12, 2a, 10, 1B.
3007	Grayback	315,647	DFCs 12, 2a, 10, 1B. Map errors exist.

* This includes entire roadless acreage as mapped, not only the part within the watershed.

Current conditions in the inventoried roadless area are discussed below in terms of their recreation attributes and their roadless character/wilderness suitability (per Forest Service direction on roadless inventory).

SALT RIVER RANGE (#3002)
The roadless area includes the crest of the range from north to south and most of the higher elevations on the Greys River side of the range.

The area is managed for grazing, wildlife habitat, and backcountry recreation, including some motorized trail corridors in Meadow, Corral, and Bear Creeks, and also including snowmobiling in winter. Alternations to the natural condition are mostly the result of old grazing practices; natural vegetation and soil has been altered ins some areas, but this does not seriously detract from the recreation experience of most visitors. Many of the major creeks that drain into the Greys River have system trails in them. Popular destinations include Corral Creek and Barstow Lakes. Some of the most scenic and undisturbed backcountry areas on the forest are within this roadless area.

Recreation resource attributes. This is an outstanding area for backcountry recreation, including settings from primitive to semi-primitive motorized. A good trail system and many access points exist. The area offers high quality backcountry settings. "Quality" of the setting, or suitability of an area to be managed for primitive backcountry, has been described in terms of factors that contribute to the Primitive ROS setting, including (1) large size OR a cohesive setting from bottom

to head of a watershed, (2) scenic quality--high level of visual variety and presence of special features and attractions, (3) undisturbed character and little to no evidence of disturbance to the natural setting, (4) opportunities for recreation activities compatible with the primitive setting, (5) access that facilitates recreation uses, including trailheads and a maintained trail system, and (6) a high degree of challenge and opportunity for solitude. The Salt River Range roadless area provides all of these attributes, particularly between Bear Creek and Sheep Pass.

Nearly all of the area has distinctive scenic character, with a high degree of visual variety, high lakes, and waterfalls. The east slope of the Salt River Range is the main recharge area for springs that surface on the western slope, including Periodic Spring. The area includes Mt. Fitzpatrick, highest peak in the Salt River Range.

Some of the most extensive tall forb areas on the forest are found in the upper basins of roadless area; some of these are in impaired condition with loss of soil and species diversity, but some are in excellent shape, including the east slope of Stewart Peak, upper Murphy Creek, upper Bear Creek, and parts of upper Corral Creek. The north slope of Sheep Pass has been treated with check dams and planting to begin restoration of a severely damaged area.

Roadless character and wilderness-related values.

Natural Integrity – high. The roadless area includes the crest of the range from north to south and most of the higher elevations on the Greys River side of the range. Excluded from the roadless area are Squaw, Murphy, North Fork Murphy, and White Creeks; the benchlands between Meadow and Three Forks Creeks, lower Spring Creek, and Poison Meadows-Tri-Basin Divide. Included in the inventoried roadless area is the Corral Creek salvage and Clear Creek (planned for timber sales but not yet entered).

Apparent naturalness - high. Some of the most scenic and undisturbed backcountry areas on the forest are within this roadless area. Alterations to the natural condition are mostly the result of old grazing practices; natural vegetation and soil has been altered in some areas, but this does not seriously detract from the recreation experience of most visitors. Some of the most extensive tall forb areas on the forest are found in the upper basins of roadless area; some of these are in impaired condition with loss of soil and species diversity, but some are in excellent shape, including the east slope of Stewart Peak, upper Murphy Creek, upper Bear Creek, and parts of upper Corral Creek. The Swift Creek Research Natural Area in the Salt River Range was designated to exemplify the tall forb cover type. The north slope of Sheep Pass has been treated with check dams and planting to help restore a severely damaged area.

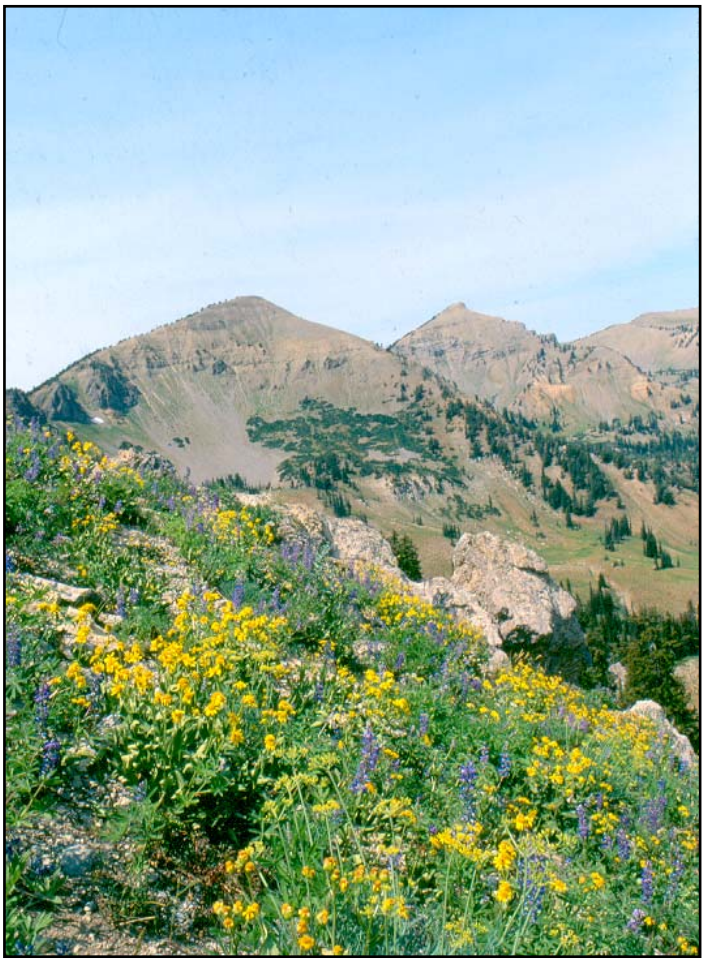
Remoteness – high. This is an outstanding area for backcountry recreation. A good trail system and many access points exist in this large roadless area. "Quality" of a backcountry recreation setting, or suitability of an area to be managed for primitive backcountry, is described in the recreation section above.

Solitude – mostly high with the exception of a few popular trails and destinations during peak use. The area has livestock grazing in summer, various forms of trail-based recreation and

snowmobling. Many of the major creeks that drain into the Greys River have system trails in them. If one avoids the most-used areas there is a high probability of seeing few to no people.

Special Features. Nearly all of the roadless area has a distinctive scenic character, with a high degree of visual variety, high mountain lakes, subalpine parks, and waterfalls. There are extensive stands of whitebark pine in the upper elevations. The area includes Mt. Fitzpatrick, highest peak in the Salt River Range.

Manageability/Boundaries. The roadless area is quite manageable as a primitive backcountry and therefore as potential wilderness.



Star Peaks, Salt River Range

SOUTHERN WYOMING RANGE (#3005)
The roadless area extends from Sheep Creek to the southern end of the Wyoming Range and west to the corridor of the Greys River.

Recreation resource attributes. Marten and Box Canyon Creeks, both within this roadless area, were found eligible for potential wild river status for their outstanding attributes of scenery and recreation. The Wyoming Range National Recreation Trail passes through the roadless area from McDougal Gap to the Middle Fork of South Piney Creek. Nearly all of the area has distinctive scenic character. Numerous waterfalls and scenic vistas from the highest peaks characterize the Wyoming Range. Wyoming Peak, high point in the range, lies within the roadless area.

Roadless character and wilderness-related values.

Natural Integrity – high. This area is steep and rugged, with a few trails giving access to the crest. It is managed for sheep grazing and backcountry recreation, including a motorized trail to Wyoming Peak. The inventoried roadless area includes several places that have been roaded and logged, including Buck Creek, Twin Creeks, Ridge Creek, part of the Corral Creek fire salvage area (lower Box Canyon Creek), and Shale-Kinney Creeks. The exploratory drill hole in Marten Creek goes slightly into the roadless area; the road has been closed and the drill pad revegetated.

Apparent naturalness – moderate to high. There is some evidence of past grazing by sheep and minor entry into the roadless are for logging and oil and gas exploration, but for the most part the area is natural and appears undisturbed. Changes to vegetation vigor, species mix and soil in the higher elevations (due to past grazing) would not be evident to the casual visitor.

Remoteness – moderate to high. The southern Wyoming Range is very remote from highways and communities; once you are there, it is a relatively narrow range from which forest roads, timber harvest areas, and other nearby activities can be seen.

Solitude – high. Except for early in the hunting season when destinations like North Piney Lake and Straight Creek are moderately used, there is a good chance of seeing no one else on all but the most popular trails.

Special Features. Wyoming Peak, at 11,200 feet, is the highest point in the range. A good trail leads from Shale Creek to the old lookout tower on top. Marten and Box Canyon Creeks, both within this roadless area, were found eligible for potential wild river status for their outstanding attributes of scenery and recreation. The Wyoming Range National Recreation Trail passes through the roadless area from McDougal Gap to the Middle Fork of South Piney Creek. Nearly all of the area has distinctive scenic character. Numerous waterfalls and scenic vistas from the highest peaks characterize the Wyoming Range. Wyoming Peak, high point in the range, lies within the roadless area.

Manageability/Boundaries. The area could be managed as roadless backcountry or wilderness and boundaries would not be hard to define nor would they cause problems for management.

Marten Creek

GRAYBACK (#3007)

In the Greys River watershed, this roadless area includes Grayback Ridge and all contiguous roadless lands, including Bailey Creek, Elk Mountain, Bradley Mountain, Middle Ridge, Deadman Peak, and south to McDougal Gap. There are errors in the roadless area boundary as mapped; neither the Deadman nor Blind Bull Road are shown, and both roads, as well as the coal mines they served, were in existence before the roadless area inventory. Roads and some of the timber harvested areas just north of Sheep Creek in the Bug Creek and Black Canyon drainages existed before the roadless area inventory. Timber harvest has also occurred here since the inventory. The Telephone Pass ATV trail (part of which is a seasonal road) is within the roadless area.

This is an outstanding area for backcountry recreation, including settings from primitive to semi-primitive motorized. A good trail system and many access points exist. The area offers high quality backcountry settings, particularly in the upper reaches of the Little Greys River.

Recreation resource attributes. This is the Forest's largest primitive/semi-primitive area outside of wilderness. It offers considerably more solitude than most areas that are in the wilderness. The Little Greys River is one of several stream segments within this roadless

area that was found eligible for potential wild river status for its outstanding attributes of scenery, recreation, and wildlife. Grayback Ridge is a landmark of scenic and historic importance, associated with Theodore Roosevelt, who hunted here. The Wyoming Range National Recreation Trail passes through the roadless area from Bryan Flat to McDougal Gap. It is managed for non-motorized recreation (except in winter). Nearly all of the area has distinctive scenic character, with a high degree of visual variety with high scenic quality.

The west slope of Hoback Peak, in the upper Little Greys River, has tall forb parks in excellent condition. The condition of tall forb sites is variable in the roadless area; Blind Bull summit is showing recovery; Deadman Peak area still has problems, as do the Bradley-Elk Mountain area, Middle Ridge, and Roosevelt Meadows.

Roadless character and wilderness-related values.

Natural Integrity. High in most parts of the area. The largest roadless area on the forest, this area includes Grayback Ridge and all contiguous roadless lands south to McDougal Gap. The evidence of past livestock grazing are found in shale gullies north of Mount McDougal and in the reduced species diversity in places like Pickle Pass, Blind Bull summit, the hills above Roosevelt Meadows and Horse Heaven Meadows.

Apparent naturalness. Most of the area appears natural—old cabins near Blind Bull summit and the leavings of past coal mines remain. There is little sign of an old airstrip near Blind Bull Summit but there are some closed roads in the area. Roads and some of the timber harvested areas just north of Sheep Creek in the Bug Creek and Black Canyon drainages existed before the roadless area inventory. Timber harvest has also occurred here since the inventory. The Telephone Pass ATV trail (part of which is a seasonal road) is within the roadless area.

Remoteness. There is a high degree of remoteness in much of this large area. Some of the most remote parts of the forest backcountry are within this roadless area, particularly in the central core where the Little Greys River begins.

Solitude. Except in popular hunting locations early in the fall elk and deer seasons there is a very good chance to seeing few to no other parties on most of the trails here.

Special Features. This is the Forest's largest primitive/semi-primitive area outside of wilderness. It offers considerably more solitude than most areas that are in the wilderness. The upper Little Greys River is eligible for inclusion in the National Rivers System. Grayback Ridge is a landmark of scenic and historic importance, associated with Theodore Roosevelt, who hunted here. The Wyoming Range National Recreation Trail passes through the roadless area from Bryan Flat to McDougal Gap. Nearly all of the area has distinctive scenic character, with a high degree of visual variety with high scenic quality. The area includes Deadman Mountain and Hoback Peak, two high landmarks.

Manageability/Boundaries. The area is quite manageable as wilderness or backcountry;

the only potential boundary problems have to do with mapping errors. The Deadman and Blind Bull Roads are shown inside the roadless area but both roads, as well as the coal mines they once served, were in existence before the roadless area inventory.

View north from Deadman Mountain

CHAPTER 3
DESIRED CONDITIONS

Introduction

While current Forest Plan standards and guidelines offer the general guidelines toward which the Forest Service directs management for physical and biological resources as well as human uses, the discussions which follow flesh out those strategies. Assumptions in the statements of desired conditions are further explained, as are the strengths and weaknesses of various current assessment methods. In a few instances, changes in legal or policy mandates are noted which require guidelines or standards not addressed in the current Forest Plan. The Bridger-Teton National Forest is expecting to update its Forest Plan in 2005, at which point congruence in guiding documents will logically increase.

Many applicable Federal Laws and Regulations also lay out the work space within which Forest employees conduct management activities. Wyoming State Statutes and County Planning and Zoning issues may affect certain activities as well. Consistency is a goal of the BTNF, although not required by law. These laws and regulations are not listed in this document, however managers are urged to find opportunities to coordinate with private land owners or local governing agencies to ensure that desired watershed conditions are met.

Heritage Resources

Heritage resources in the assessment area will be protected and, where feasible, made accessible to the public through interpretation and other opportunities.

Watershed Function and Aquatic Habitat

All sub-watersheds will be in a fairly stable condition, resilient enough to handle natural and human-induced disturbances. Working with other resource areas including recreation, timber, wildlife, and the transportation system will expedite watershed protection and improvement efforts. Stream reaches will be inventoried to determine their condition. Stream reaches in an impaired condition will be identified and their needs incorporated into sub-watershed improvement projects.

Management will minimize erosion and sedimentation to geologic background levels. Ground disturbing activities including allotment management plans, annual operation plans, and other vegetation management projects will establish measures to stabilize and mitigate sedimentation sources to address Forest Plan watershed and riparian area standards and guidelines. Road management objectives are finalized and implemented. Rehabilitation plans for protection and mitigation of identified watershed impairments

will be developed and funding priorities established for inclusion with the Forest annual program of work.

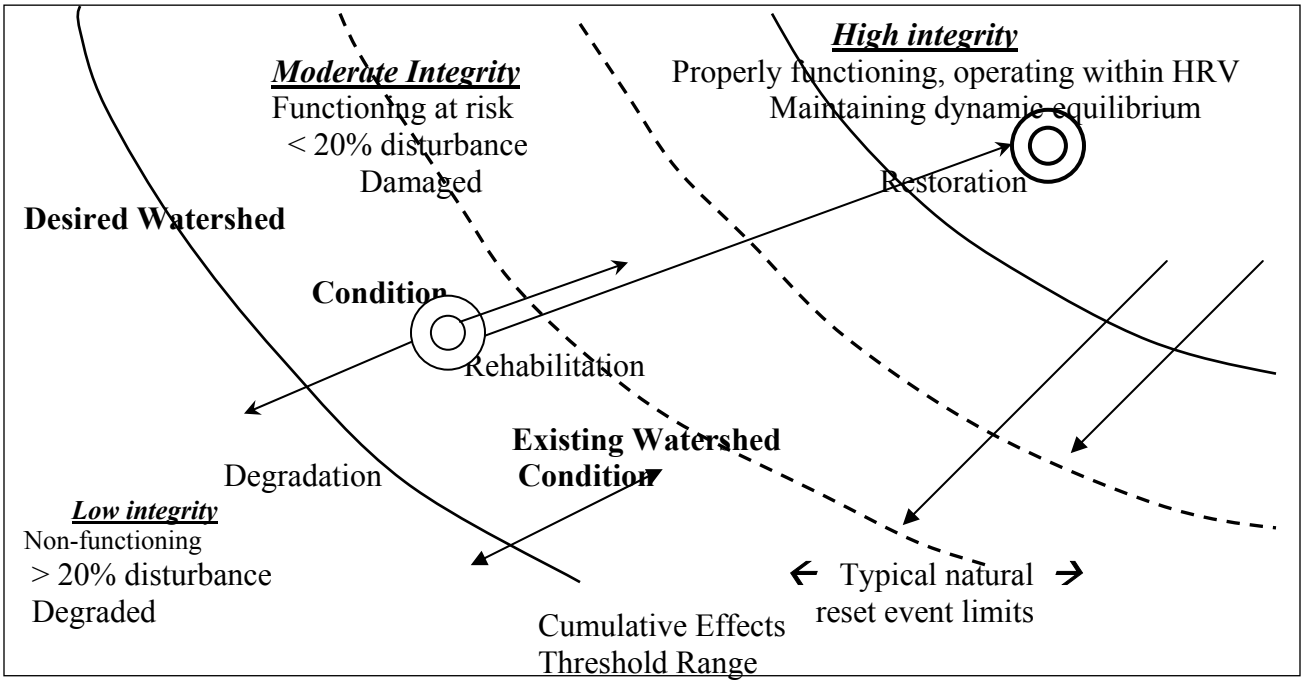
Any sub-watersheds in a precarious condition will warrant extra care to protect and improve their condition. Additional data will be collected to refine problem areas and develop mitigation measures and/or rehabilitation plans.

Roads, past timber management, and range management are the prime concerns for these watersheds primarily because of the presence of landslides. Allotment management plans and annual operation plans should establish measures to stabilize and mitigate sedimentation sources related to domestic livestock operations. The area also has highly erodible soils that are very sensitive to disturbance. Associated streams within the watershed carry heavy amounts of sediment during snow melt and heavy rainfall periods of the year.

The conceptual idea behind the application of the Inland West Watershed Initiative rating system to the Greys River LSA is that the BTNF would like all the sub-watersheds to be rated as high geomorphic integrity. We are assuming that a high integrity rating means the sub-watersheds are operating within their historic range of variation (HRV). Therefore they are resilient and their recovery rates are relatively fast, which allows moderate management-related disturbances to occur without seriously damaging the sub-watershed. Figure 3.1 shows a hypothetical explanation of this concept. If the cumulative impact of all the disturbances is held within the HRV area with the occasional exception of reset events (e.g. large floods, landslides, fires), then we can expect to maintain healthy watersheds and the biotic life that they sustain. However, if you sustain higher than HRV cumulative disturbance levels, then it can be expected that a watershed's ability to recover from an additional event (e.g. management activity or natural event) is small, and there will be adverse changes to the watershed. Consider the impact of management activities (e.g. a poorly designed road system) that increase fine sediment levels in trout spawning beds and an exotic species (e.g. brook trout) is introduced. Then a stream channel's ability to maintain adequate habitat may be hampered and a native trout may risk extinction.

Once a watershed has moved outside its HRV, it may require rehabilitation or restoration efforts such as revised management or physical manipulation to aid in its recovery. Using the IWWI geomorphic integrity rating system allows the BTNF to determine initially which sub-watersheds are currently damaged or degraded. Then the LSA helps determine if more investigation is needed to identify problematic areas and the related causes of damage. Finally, a recovery plan can be initiated (e.g. administrative changes or rehabilitation efforts) that will address the causal mechanisms and help return the sub-watershed to within its HRV (i.e. high integrity condition).

Figure 3.1. The conceptual figure describes the IWWI geomorphic integrity rating calls and how they describe watershed conditions and recovery (Figure modified from Bradshaw 1984).



Max **Geomorphic Integrity**

It is assumed that occasional natural deviations from the HRV or reset events like large landslides or floods provide diversity and eventual landscape evolution, while the more common events (e.g. bankfull flows) maintain the dynamic equilibrium form and do a majority of the work (Wolman and Miller, 1966). These events transport sediment, cause channel migration, scour and fill the channel bed, and maintain riparian vegetation communities (e.g. provide fresh surfaces for cottonwood initiation or erode older vegetation). The intermittent cyclic pattern of the weather and precipitation regimes provides for reset events (e.g. floods or droughts) and dynamic equilibrium maintenance events. Periodic larger flood events help to shape the stream channels and landscape. Typically each large flow is followed by a diversity of flows (low and moderate) before the next large flow. This allows the system time to recover and adapt to any new changes such as channel avulsions or erosion. If there are compounding events or cumulative impacts then we can expect a system to remain damaged or degraded for some unknown period of time. This is where a more detailed survey may be appropriate to determine if rehabilitation efforts are necessary to bring the system back into properly functioning condition.

Vegetation

Ecological Status of the Aspen, Tall Forb, Riparian, and Conifer Vegetation Associations

In 1997, the Bridger-Teton National Forest assembled a team for the purpose of evaluating the major vegetation associations on the forest. This evaluation followed the protocol established by the Forest Service's Regional Office (Ogden, Utah) in determining whether upland vegetation communities were within or outside of "properly functioning condition" or their historic range of natural variation. The Forest's effort tiered-off of the Region's Intermountain Sub-Regional Assessment (draft, July 17, 1996) and evaluated which of those communities were at risk for being out of the historic range of natural variation.

The Greys River Landscape Assessment interdisciplinary team utilized and tiered-off of the Forest's evaluation to determine on a more site-specific level which of the vegetation associations identified as part of the issues were within the historic range of natural variation, at risk of moving outside this historic range, or were already outside the historic range of natural variation. As part of this evaluation, the interdisciplinary team determined more specific descriptions for disturbance regimes, landscape patterns, and community structure and composition. These desired conditions are displayed in the properly functioning condition write-ups for the various tree and plant species. The interdisciplinary team also took into account that the currently accepted definition and use of "historic range of natural variation" may not be as helpful as expected in light of the information assembled on the Little Ice Age and recent findings or data pertaining to disturbance regimes. This is described in the section on historic range of natural variation, and will not be repeated here. This information served as a caveat when developing the statement of desired condition for the vegetation associations described below.

Alpine Communities

Maintain existing condition and extent.

Mountain Shrub and Sagebrush Associations

The desired condition is to restore and maintain a mosaic of mountain shrub associations in properly functioning condition.

Tall Forb Association

The desired condition for this association is similar to that described in the Forest's assessment for the historic range of natural variation at the landscape level. The desired condition in tall forb is to maintain stands and for trends to be upward in terms of vigor, diversity, and ground cover. Erosion rates are acceptable, not accelerated because of bare ground and gullies. Indicator species for tall forb (*Delphinium occidentale, Ligusticum, Geranium, Lupinus, Erigeron speciosa*, and others, including associated grasses and sedges - *Melica bulbosa, Carex raynoldsii*, etc.) comprise at least 50% of the total vegetation, and ground cover is greater than 80%. Increase diversity of tall forb

community sites dominated by *Wyethia* and/or tarweed, where soil/rock types favor this outcome.

Grassland, Meadows, Dry Park Associations
The desired condition is for greater diversity and vigor over existing condition where trampling and overuse has occurred, and to reduce undesirable non-native plants or increasers that indicate overuse. Generally, maintain or increase the existing extent of these communities, keep conifer from encroaching on them, and periodically reduce shrub cover.

Riparian and Wetland Associations, including wet meadows
The desired condition for this association is similar to that described in the Forest's assessment for the historic range of natural variation at the landscape level. On a site-specific basis of 5-20 acres, cover and structure of the community type is sufficient to slow overland flow and filter sediments. Stream gradient, stream meanders, and flow regimes result in channel morphologies within properly functioning condition.

Aspen Association
The desired condition for this association is also similar to that described in the Forest's assessment for the historic range of natural variation at the landscape level. Because small scale natural disturbance regimes have been interrupted, the aspen community type is not meeting the historic spatial variation in age classes and structural diversity. Conifer encroachment is also occurring in greater than 15% of the aspen stands. Approximately 70% of the aspen community type should be treated to maintain and enhance the age class distribution and improve the resiliency of these aspen stands. The desired condition is to maintain or increase acreage in aspen in the northern part of the watershed, on a large scale. On the southern end (south of Sheep Creek) aspen is maintained where it currently occurs, and expanded by vegetation treatment to meet the properly functioning condition outlined in this document for aspen stands, using fire or timber management. Aspens being encroached by conifers are rejuvenated by natural disturbances or management activities.

Timber Management

General: Improve the health and sustainability of the timber stands by developing more resilient timber stands to meet the many and varied demands placed on these resources from all forest uses.

Reduce fuel accumulations to acceptable levels in areas strategic to fire management activities to lessen the risk of catastrophic wildfire.

Provide personal use forest products that are needed by the local community. Annual harvest, including all products, is in accordance with what the land can sustainably provide from one year to the next, somewhere around 1 - 3MMBF/year, exclusive of unplanned fire salvage.

Properly Functioning Condition (PFC) Lodgepole pine subject area

The desired future condition for Lodgepole pine is similar to that described in the Bridger-Teton's PFC, (September, 1997). A maximum of 60% of the Lodgepole pine type should be in mature or old age classes (greater than 150 years old). Approximately 20% of the stands should have multiple canopies. Stand Density Indexes should be less than 350 and Basal Areas less than 90. Nearly all stands should be even aged. A balanced range of structure classes include:
Approximately 10% in grass/forb.
Approximately 10% in seedling/sapling.
Approximately 20% in young forest.
Approximately 20% in mid aged forest.
Approximately 20% in mature forest.
Approximately 20% in old forest.

Properly Functioning Condition (PFC) Douglas-fir subject Area

The desired future condition for Douglas-fir is similar to that described in the Bridger-Teton's PFC, (September, 1997). A maximum of 70% of the Douglas-fir type should be in mature or old age classes (greater than 175 years old). Not more than 50% of the stands should have multiple canopies. Stand Density Indexes should be less than 298 and Basal Areas less than 160. A balanced range of structure classes include:
Approximately 10% in grass/forb.
Approximately 10% in seedling/sapling.
Approximately 20% in young forest.
Approximately 20% in mid aged forest.
Approximately 20% in mature forest.
Approximately 20% in old forest.

Properly Functioning Condition (PFC) Engelmann Spruce & Subalpine fir Subject Areas

The Bridger-Teton combined Engelmann Spruce and Subalpine fir species into one PFC subject area. The desired future condition for Engelmann Spruce and subalpine fir is similar to that described in the Bridger-Teton's PFC, (September, 1997). A maximum of 50% should be in mature or old age classes (greater than 175 years old). Approximately 40% of the stands should have multiple canopies. Stand Density Indexes should be less than 335 and Basal Areas less than 150. Young stands are even aged and older stands tend to be unevenaged. A balanced range of structure classes should include:
Approximately 10% in grass/forb.
Approximately 10% in seedling/sapling.
Approximately 20% in young forest.
Approximately 20% in mid aged forest.

Approximately 20% in mature forest.
Approximately 20% in old forest.

Properly Functioning Condition (PFC) Whitebark & Limber pine Subject Area

Although separate and distinct PFC's exist for both species, acres of whitebark pine and limber pine were lumped together. The desired future condition for whitebark pine is similar to that described in the Bridger-Teton's PFC, (September, 1997). Mature stands, (greater than 175 years old) do not exceed 70% of the acreage. Stand Density Indexes should be less than 100 and Basal Areas less than 100. A balanced range of structure classes include:
Approximately 10 to 20% in grass/forb and seedling/sapling. (Average 15%)
Approximately 30 to 50% in young, mid and mature forest.(Average 40%)
Approximately 20 to 40% in old forest. (Average 30%). The only criteria different for limber pine is that mature stands should not exceed 60% of the total acreage.

Properly Functioning Condition (PFC) Aspen

The desired future condition for Aspen is similar to that described in the Bridger-Teton's PFC, (September, 1997). Depending on the time since the last large scale catastrophic fire, a balance of stages may exist or one stage may predominate across large areas. Catastrophic fires reset stand development over large areas at 100 to 200 year intervals. Small scale fires occur more frequently, creating a mosaic of age and structure until the next large scale fire. Stand Density Indexes should be less than 300 and Basal Areas less than 140. A balanced range of structure classes include:
Approximately 40% in grass/forb and seedling/sapling.
Approximately 30% in young, mid and mature forest.
Approximately 30% in old forest. In addition, conifers are abundant on about 15% of the area, depending on the community type.

Future Vegetation with Continued No Action

Under continued full fire suppression and limited management of forested vegetation, fuel loads will continue to increase and provide conditions prone to large wildfires. Succession will continue in older conifer stands. There will be an increase in mortality and an increase in insect and disease activity. Fuel loading will increase creating greater risk to stand replacing fire. Dwarf mistletoe in lodgepole pine will continue and intensify. Mountain pine beetle attacks will occur in young and mid aged lodgepole pine stands where densities are not managed. Bark beetles in subalpine fir and spruce beetle in Engelmann spruce would continue to affect increasing numbers of trees resulting in increased mortality and reduced growth throughout the area. Natural and human caused fires would continue to be

a periodic disturbance. Fire frequency and fire severity will most likely increase. Fire will become the dominant disturbance regime replacing portions of young, mid-aged, mature and old forest with regeneration, or create new non-forested openings from forested acres.

Forested stands will not be maintained in a condition of forest health. Opportunities using timber sales as a tool to improve forest health by removing trees affected by insects and disease would be foregone. Opportunities to reforest areas (both natural and human) and control stocking densities using revenue created from timber sales will be forgone.

Wildlife and wildlife habitat associated with old forest stand structure characteristics will continue to benefit from no change in current stand structure. These benefits may be enjoyed for the short-term until large fires create stand initiation stand structure. Wildlife and wildlife habitat associated with stand initiation or young forest stand structure characteristics will not benefit from old forest stand structure characteristics for the short term until such time as fire creates stand initiation stand structure.

The health of the lodgepole pine component of the Forest would continue to decline. Dwarf mistletoe infection would increase in all stands, causing increasing mortality of overstory trees and severely reducing growth of affected trees. The stressed trees would also be susceptible to other agents such as decay fungi. Subalpine fir currently in the understory will gradually fill in the overstory as lodgepole declines.

Subalpine fir susceptibility to bark beetles and disease agents increases with drought or density related tree stress. With the decline in lodgepole pine and an associated increase in subalpine fir, the combination of down and ladder fuels will increase fire hazard for intense and severe fires.

Within the area, changes will occur in stand structure. Existing clearcuts meeting cover definitions will move into stem exclusion closed canopy stand structure. If their densities are not reduced, these stands would be susceptible to Mountain Pine Beetle. Existing clearcuts not meeting cover requirements will soon meet cover requirements and be maintained as stand initiation stand structure and will soon no longer be considered created openings. Through succession, Old Forest Single strata lodgepole pine will advance into Old Forest Multi Strata as the dominant lodgepole pine overstory declines and is replaced with an establishing subalpine understory.

Past vegetative treatments harvested Mountain Pine Beetle infested lodgepole pine. An impact of past clearcutting reduced the spread of Dwarf Mistletoe. Prescriptions implementing clearcutting in Dwarf

Mistletoe infested lodgepole pine or Douglas-fir will reduce the spread of the infection. Treatments will result in more vigorous forests across treated landscapes.

Some activities, such as firewood cutting along existing roads would continue, resulting in salvage of some dead trees along roads. Without vegetation treatment, the Forest Plan would not be implemented. Opportunities to utilize forest resources as wood products to benefit local communities and public consumers would be forgone.

Grazing Management

Livestock grazing will continue to be a use in the drainage, with intensities and management accommodating other resource considerations, such as vegetative diversity, plant community health, sedimentation movement, recreation, and wildlife needs. Allotment management plans will be current and in compliance with national standards. Grazing capacity will be set in accordance with health of the plant communities. Known resource conflicts, such as among recreation, wildlife, and domestic grazing along the Greys River, will be resolved. The goal is to have healthy plant communities that not only provide forage, but also inhibit sediment movement and soil erosion. They should also be relatively free of invasive and noxious weed plant species.

Wildland Fire Management

The desired condition is to allow for disturbances, natural (fire) and human (mechanical or prescribed fire.) The Greys River LSA is complex, with a mix of social and economic values. The LSA has private land and structures located within the Greys River drainage. The timber resource, watershed, developed recreation sites, dispersed recreation sites, guard stations and fire lookouts will need protection.

Human caused disturbances such as timber harvest, prescribed fire or other mechanical disturbances mimic natural processes.

Based on topography, vegetation, economic values and social values in the Greys River drainage, different fire management strategies will be needed to provide the best management practices for the area. Some areas (timber stands, recreation sites and private land) will have constraints that must be integrated with fire management plans for both natural and prescribed fire.

The Forest Plan has been amended (2004) to allow natural fire management in this area. The B-T Fire Management Plan will be updated to include use of fire across the forest.

A portion of the Wyoming Range from Deadman Peak to Cheese Pass would be an area lending itself to be managed under a wildland fire use plan (prescribed natural

fire.) From Deadman Peak to Grayback Ridge could provide opportunities for wildland fire use. Boundaries would be identified during project development. The eastern slope of the Salt River Range could also be managed for wildland fire use. Concerns for these above mentioned areas would be protection of the timber resource found on the benches in the LSA. The timbered benches are DFC 1B or 10 as identified in the Bridger-Teton National Forest Plan. Land managers will make decisions dealing with natural fire or prescribed fire and the management of fire that will best meet the desired future condition for the area affected. Items that will need to be identified are location of the fire, current weather patterns (drought conditions) topography, vegetation cover, social and economic values, developed recreation sites, guard stations, private land and improvements (sprinkler pipes and water sources etc.) and buildings on private land.

General Guidelines

*Wildland fire will be managed as an integral part of reaching the desired future condition.

*Allow natural fires to burn without human interference provided that a wildland fire use plan is in place.

*Suppress human-caused fire in a cost efficient manner that emphasizes protection of resource values. Suppression efforts will be selected that minimize any long-term effects of the fire suppression tactics.

*Use management ignited fire when it is evident that either natural fire cannot be managed safely and efficiently or when there are other compelling reasons to take this more active approach. This would include protection of improvements and private land in the LSA.

*Identified cultural sites will be protected as appropriate.

*Dead and down fuels will be allowed to fluctuate within these disturbances. The fluctuation would range from 2 tons per acre to over 30 tons per acre. As the tons per acre increase to the upper limits prescribed fire could be used to reduce the fuel build up.

*In high value or risk areas, fire management will emphasize protection to improvements or resources.

*Fire management would combine the use of natural fires with management ignited and mechanical treatments (timber sales, thinning, fuel reduction) to best mimic natural disturbances. Human caused disturbances will mimic natural occurrences in terms of size, shape and intensity. Size of natural disturbances will range from 1 acre to approximately 2000 acres. This is similar to the historic fire sizes from the past.

*Fires will be used to enhance resource values. This would include but is not limited

to aspen regeneration, grass, forb and brush production.

*An active fuels reduction program will provide defensible areas around investments such as private land, developed campgrounds, guard stations and other forest facilities.

*Smoke management concerns around high recreation use areas will be emphasized.

*Long term monitoring of the vegetation will be done to determine the degree that management actions best mimic natural processes.

Insect and Disease Epidemics

Endemic populations of insects and diseases have always been a part of the ecological processes working within the Greys River watershed. Like other biological processes, epidemic levels occur, and have always played a key or pivotal role in shaping the vegetation resources of the landscape. The interdisciplinary team felt that these ecological processes should be allowed to continue unabated as long as they are within historic levels of activity. Monitoring of insect and disease activity is encouraged, but reduction or eradication activities are not recommended except where needed for safety at administrative sites and campgrounds.

Noxious Weeds

The ultimate goal would be to eliminate noxious weeds from the drainage. This is likely not possible. A more achievable goal would be to keep the species that are present from spreading, or reduce the number of affected acres, through aggressive control methods and proper vegetation management. The Cooperative Noxious Farm Weed Control Plan between Lincoln County and the Greys River Ranger District is working effectively. Allotment Management Plans will identify noxious weed infestations and contain provisions to manage livestock grazing to discourage the proliferation of noxious weeds.

Wildlife Habitat

General Guidelines

Natural and human-induced disturbance regimes produce habitat in varying successional stages distributed across the assessment area. This will include aspen habitat that is in properly functioning condition within most of its historic distribution in the assessment area and that is maintained in properly functioning condition by periodic disturbance. It will also include properly functioning riparian habit and mosaics of sagebrush/mountain shrub, and grassland communities and sagebrush habitats in properly functioning condition. There is ample potential to provide sufficient suitable habitat to support

sustainable populations of all native wildlife species. Suitable habitat exists for federally listed species that could potentially utilize or reestablish populations within the assessment area. Forest-wide resource management goals, prescriptions, standards, and guidelines established in the Bridger-Teton National Forest Land and Resource Management Plan (LRMP) to meet wildlife needs are implemented.

Game Species

Maintain or enhance habitat conditions to support populations of all designated big and trophy game species within population objectives established by the WGFD and agreed to by the BTNF and in support of the WGFD's Statewide Habitat Initiative and Strategic Habitat Plan.

No management actions will effectively prohibit mountain goats from expanding their ranges.

Bighorn sheep range expansion is strongly encouraged when opportunities develop.

Big-game numbers are within their established population objectives, as set by the WGFD and agreed to by the BTNF.

Maintain the extent of existing winter ranges for all ungulate species and improve trend and vigor of both winter and transitional spring/fall range.

Objectives of the WGFD integrated feedground management plans have been accomplished. Brucellosis is no longer present in wildlife populations. Habitat conditions reduce elk dependence on supplemental feed.

Any management actions that may be taken to prevent the spread of Chronic Wasting Disease in ungulates, or reduce its impact, are effectively implemented.

Adequate amounts (> 30%) of security cover are provided and distributed throughout the assessment area.

Maintain sport fish populations that meet WGFD objectives and agreed to by the BTNF.

Maintain natural connectivity between tributaries and the Greys and Snake River for fish and aquatic wildlife passage.

Any management actions that may be taken to improve water quality are effectively implemented.

Threatened, Endangered and Sensitive Species

Sufficient habitat is present to meet the requirements of all Threatened, Endangered, and Sensitive species residing or capable and likely to reside within the assessment area.

Sufficient habitat is provided to maintain sustainable populations of all native resident wildlife species.

Bald Eagles: Site-specific management plans are developed for any bald eagle territory established within the assessment area. Management of bald eagle habitat protects nest sites, foraging areas, and roost sites by restricting human activity in these areas when eagles are present

Boreal owls: Nesting habitat is managed through snag, large woodpecker, and aspen management. Snags over 12 inches DBH are part of intact forest stands. Maintaining a dispersion of small aspen stands with large diameter trees provides adequate nesting habitat. Timber management that is compatible with abundant small mammal populations is practiced. Uneven-age timber management may be compatible, but clearcuts are not considered suitable foraging habitat.

Amphibians: Amphibian habitat and populations are protected. Inventories are completed for potential habitat and occupation. Amphibian conservation measures are incorporated in land management plans and projects.

Finespot Snake River cutthroat trout: Management will be consistent with the WG&FD Management Plan. Fish passage is managed through travel management and road maintenance. Culverts and bridges should be designed using agency direction to allow fish passage.

Canada Lynx: The conservation measures outlined in the BTNF Forest Plan Canada lynx amendment are implemented. Vegetation management practices address the habitat needs of lynx and their principal prey. Silvicultural prescriptions are designed to give greater emphasis to retention of live and dead trees and coarse woody debris, which are important habitat components (Ruediger et al. 2000). In lynx habitat on suitable sites, final harvest treatments should result in patches of dense regeneration of mixed conifers, including a spruce/fir component. At the landscape scale, a mosaic of early successional forest and mature conifer forest are maintained for snowshoe hare and lynx.

Grizzly bears: Management will be consistent with the Wyoming Grizzly Bear Management Plan. The public is informed and there is a high degree of voluntary compliance regarding camp sanitation and storing food and refuse in ways these are not available to black bears and other wildlife. Management emphasis in multiple use land allocations will not change if grizzly bears occupy the assessment area. Additional National Forest land use or management restrictions will not be made to accommodate grizzly bears. When delisting occurs, management of the animal will be consistent with state direction.

Gray wolves: Management emphasis does not change if gray wolves occupy the assessment area. No additional land use restrictions or habitat manipulations are necessary for gray wolves.

Fisher: Protecting big game security areas, especially in riparian corridors, and maintaining a diversity of age classes will maintain fisher habitat. Surveys are performed to determine if fisher are present within the assessment area. Reintroduction of the species may be feasible.

Flammulated owls: Maintaining adequate amounts of old-growth forest and big game security areas should provide suitable foraging habitat. Adhering to the LRMP's snag habitat guideline provides sufficient nesting habitat. Surveys are performed to evaluate flammulated owl occurrence within the assessment area.

Great gray owls: Management for great grays includes protection of nest sites by reducing human activity near nests during the nesting period. Intensive timber harvesting and firewood cutting near nest sites is managed carefully to prevent loss. A no-harvest buffer around meadows and natural openings may protect foraging habitat near identified nest sites. Maintaining habitat diversity provides sufficient great gray habitat.
Harlequin ducks: A formal survey for harlequin ducks and other sensitive species has been conducted. Trails and roads should be greater than 165 ft from inhabited streams and should not be visible from the streams.
Goshawks: Prior to land disturbing activities, potential breeding habitat is surveyed according to FS Intermountain Region protocol. The protocol recommends surveys be performed a minimum of two years, as goshawks frequently change nest locations. Maintaining big game security areas and habitat diversity protects foraging habitat. There may be opportunities for enhancement of prey populations and foraging habitat with prescribed fire or mechanical treatments.
Spotted bats: Potentially suitable cliff areas have been surveyed for roosting sites. Any occupied roost sites are protected.
Peregrine falcons*:* Site-specific management plans are developed for any falcon territory established. Human activities are restricted within 0.5 miles of occupied eyries between March 1 and July 31. Developments on National Forest land, within one mile of nest sites, with adverse long term impacts on foraging habitat are not allowed. Resource uses and management projects within one mile of established eyries are modified as needed to avoid conflicts with nesting falcons and improve foraging opportunity. Potentially suitable cliff areas, especially sites of historic of eyries, are periodically surveyed during the nesting season to determine if they have been re-occupied.
Three-toed woodpeckers: Protecting sufficient numbers of snags ensures their availability to woodpeckers and other snag-dependent species. Within a vegetative treatment area, forest stands containing dead, down, and green trees are provided to serve as wildlife snag patches. Only silvicultural practices that achieve desired snag attributes are used in stands managed as wildlife snag patches. The snag patches are 5 acres or more in size and well distributed. An average of 60 acres per section is retained and unavailable for timber harvest or firewood cutting. A mixture of snag species and diameters is maintained for diversity. Retention of snag groups in and adjacent to timber harvest units is considered when opportunities are available.
Townsend's big-eared bats: Potential roost and hibernacula sites have been evaluated. These include caves, mineshafts, rock outcrops, and abandoned buildings. Cave exploration and similar activities is regulated at known roost sites.
Trumpeter swans: Nest sites are protected from disturbance if swans breed within the assessment area.
Whooping cranes: If a whooping crane population becomes established within the Greater Yellowstone Area and utilizes the assessment area, high levels of human disturbance such as building activities and low-level helicopter activity does not occur when cranes are present. Transmission lines through important whooping crane habitat are identified and modified to help reduce crane mortality.
Wolverines: Wolverines use a variety of habitats over a large area. Females at natal dens are sensitive to disturbance. In the event a den is discovered, winter recreational activities are modified as needed to protect the site. Maintaining habitat diversity and big game

security areas provides suitable wolverine habitat. Maintenance of sustainable big game populations will be a long term benefit due to the species use of carrion. Ongoing monitoring will determine wolverine presence and guide management.

Management Indicator Species

The Forest Plan is being amended to select MIS that are both effective indicators and also readily monitored. These species are monitored over time to determine trends that can be linked to vegetation and resource management activities. Monitoring information is used in planning efforts to shape programs and projects to maintain or enhance habitat for these species.

Predator Control

Predator control adheres to the BTNF LRMP animal-caused damage control standard. The FS advises and consults U.S. Animal and Plant Health Inspection Service (APHIS) on predator control needs, control methods, and special precautions needed for each grazing allotment. Control is based upon an analysis of losses and the need for control. Where need is demonstrated, control efforts are directed towards offending animals. APHIS provides information on livestock losses, predators removed, and control method effectiveness. For predator control activities within lynx habitat, recommendations established through formal consultation, in accordance with Section 7 of the Endangered Species Act, are followed. The use of traps and other control devices is prohibited within 100 feet of system trails to protect hikers and domestic pets.

Sensitive Plants

All suitable habitats are surveyed for sensitive plants potentially occurring within the assessment area; known populations are monitored to determine population trends. Sufficient habitat exists to sustain viable populations of all sensitive plants. Protection measures are in place, if necessary. Prescribed fires and other disturbances promote Payson's milkvetch population expansion.

Transportation System

General Guidelines

The desired character of the Greys River Road is similar to the current situation, while road conditions and maintenance level improves. Road segments vary in development and maintenance level, consistent with the resource objectives of the surrounding area.

Dust abatement on the Greys River road is effective in segments where use is heavy and sedimentation to the river is occurring, and where campgrounds and popular semi-developed camps are located.

Large culverts and bridges are constructed where needed, as well as better ditches, to move water from spring run-off across roads without saturating them. This is of most concern on the Greys and Little Greys River roads that are used all year by motorized vehicles and/or snowmobilers. Drainage structures associated with the transportation system do not hinder fish passage.

Greys River Road is not in sensitive riparian areas near the river.

Road Management Objectives

Road management objectives are assigned for open roads. Road management objectives for those roads considered priorities for concentrated public recreation use are included here.

Greys River Road:

Based on level of use, presence or absence of developed sites, remoteness, character of the land surrounding the road, and number and use of dispersed sites, road management objectives for the Greys River Road differ slightly.

1. Forest boundary near Alpine to Murphy Creek CG. Most used area, heavy traffic, much use by recreation vehicles, ATVs, logging trucks, livestock trucks. Recreation use includes camping, day use, large groups. The road is also used in winter as a groomed snowmobile trail. In winter it gets heavy use as far as the Box Y Ranch.

> Road management objectives: Manage for use by all forms of traffic, with moderate to high volume. Two lanes. Apply dust abatement for safety and to reduce sedimentation to the river. Keep design speed at 30 - 35 MPH. Improve grading practices to lengthen life of the existing road surface.

2. Murphy Creek CG to Forest Park. Use by all types of traffic. Most of the developed campgrounds are in this segment. Sheep Creek gives access to Wyoming Range and east side via McDougal Gap. Most of the secondary recreation roads and opportunities for OHV use accessed via Greys River Road are found in this segment.

> Road management objectives: Manage for use by all forms of traffic, with lower traffic volume than in Segment 1. Apply dust abatement to increase safety and reduce sedimentation to the river. Keep design speed at 30 MPH.

3. Forest Park to Kinney Creek. Considerably less commercial and recreational traffic than Segments 1 and 2. More primitive and remote, trail access to Salt River and Wyoming Ranges, numerous semi-developed and primitive roadside camps. Road used to access backcountry trails and for through traffic.

> Road management objectives: Manage for use by all forms of traffic at low traffic volume, while retaining two lanes. Provide dust abatement near turnouts and established campsites such as the one at Box Canyon Creek. Improve surfacing and grading. Reduce

sedimentation where road is close to river, which could involve retention structures or relocation of the road. Provide regulatory and directional signing, and pullouts as needed for passing. Relocate road from riparian area between Corral and Spring Creeks.

4. Kinney Creek to Tri-Basin Divide. Manage for use by most types of vehicles at low traffic volume. One lane with many pullouts, good gravel surface. The long-term objective is to relocate the Greys River Road above Clear Creek, to get it well out of the streamside area. If this occurs the existing road will be closed and rehabilitated. Primary recreation uses in this segment: access to remote roadside camps, trailheads into the backcountry, scenic driving to LaBarge Meadows and Smiths Fork.

Road management objectives: Design speed at 25 MPH or slower, one lane with turnouts. Improve surfacing and grading on that part of the road that will remain in its present location. Provide regulatory and directional signing, pullouts as needed for passing. Replace deficient bridges at Shot Hole Springs, Poison Creek, and East Fork.

Other roads in the analysis area:

Little Greys River Road. Road management objectives: Manage for use by most traffic, with low to moderate traffic volume and only occasional use by very large vehicles such as lowboys. Keep design speed at 20-30 MPH, two lanes with frequent pullouts. Provide regulatory and directional signing, pullouts suitable for small RVs and other vehicles. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

Murphy Creek Road. Road management objectives: Manage for use by recreation traffic, with low to moderate traffic volume and rare use by very large vehicles (switchbacks are not suitable). Keep design speed at 20 MPH, two lanes as far as Murphy Lake; one lane with turnouts beyond. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

Deadman Creek Road. Road management objectives: Manage for light use by small vehicles beyond the sheep staging area. Provide drainage and surfacing on parts of the road subject to water damage. Design speed of 15 MPH, one lane with pullouts and access to trailhead parking. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

Little Elk - Porcupine Road. Road management objectives: Manage for use by high clearance vehicles and ATVs, light to moderate traffic. Keep design speed at 15 MPH, one lane with frequent pullouts. A possible candidate for ATV route in fall. Continue seasonal closure to protect elk calving areas. Repair mudholes and improve drainage.

Blind Bull Road. Road management objectives: Manage for low to moderate traffic volume and smaller vehicles (dugway is narrow with no opportunity to create more pulloffs). Keep design speed at 20 MPH, one lane with pullouts. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

Bear Creek Road. Road management objectives: Manage for moderate traffic volume and only occasional use by very large vehicles. Keep design speed at 10 MPH, one lane. Native cobble surface seems durable without gravel; gravel may be needed in deep holes and muddy areas at upper end of the road. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

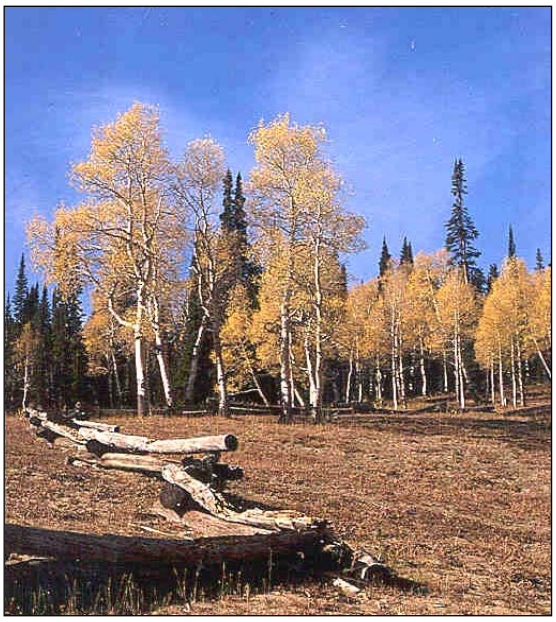
North Three Forks Road. Road management objectives: Manage for use by pickups and most passenger cars, so 4WD is not necessary to access the trailhead. Low to moderate traffic volume. Keep design speed at 20 MPH, one lane with frequent pullouts, ditching and drainage, and gravel surface. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

Meadows. Road management objectives: Manage for moderate traffic volume and only occasional use by large vehicles. Keep design speed at 15 MPH, one lane with gravel surfacing where it is lacking. Maintain bridge across Greys River. Provide regulatory and directional signing and pulloffs. Provide gravel pulloff at the Meadow Creek Trailhead. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

McCain Meadows - Waterdog Lake. Road management objectives: Manage for moderate traffic volume and only occasional use by large vehicles. Keep design speed at 20 MPH, one lane with gravel surfacing where it is lacking. Provide regulatory and directional signing and pulloffs. Gravel pulloff at Big Dad Spring. Ditching and drainage structures should allow for access to established roadside camps, trailhead parking, and pulloffs.

White Creek, Cabin Creek, Spring Creek, Stump Lake, Kinney Creek, Squaw Creek. These are all low-development roads that give access primarily to trailheads. Most are old logging roads that have been gated at some point, and have received little to no maintenance since. Cabin Creek, for example, is very rough and eroded, suitable for high clearance only. White Creek is full of springs and seeps. Most of these roads connect with important backcountry trails, and they serve recreation vehicles, including some trucks pulling horse trailers. Maintain roads for use by pickups and higher-clearance passenger cars, so 4WD is not necessary to access the trailhead. Low traffic volume. Design speed at 10 MPH, one lane with frequent pullouts, ditching and drainage, and gravel surface where needed. Note on Kinney Creek Road: currently a loop road, meeting the Greys River at Shale Creek. If the Greys River Road gets relocated this will become a one-way road giving access to the Wyoming Peak trailhead.

Recreation



To help develop a desired condition for the recreation resource in this LSA area, we have used public comments received through field visits, comment cards, and other sampling methods used between 1993 and 1997. In the absence of more formal public involvement efforts as part of this analysis, comments received from users are driving our preliminary desired condition. The basic assumption underlying desired condition statements that follow is that most people want to see the area remain pretty much as it is, with its current mix of opportunities.

Recreation Settings

The desired recreation settings in the watershed include small areas of concentrated public use and development, various recreation routes and their corridors of influence, and backcountry, quite similar to what exists now. The primary difference between maps of current and desired recreation settings is that the desired scenario recognized those settings with the highest-quality attributes for backcountry recreation as identified in Chapter 2. See also Map 2.3 on page 121 of this document.

Roaded Corridors These corridors are the primary roaded areas with a desired emphasis on recreation and scenery. These are where most visitors gather for dispersed camping and use of developed sites such as campgrounds and for river access. See Transportation section (above) for Road Maintenance Objectives.

Semiprimitive motorized settings will include a mix of primitive jeep-only roads, routes suitable for ATVs and trails suitable for two-wheeled bikes. Opportunities for this type of use will be limited to those areas where suitable soil and terrain exists and where maintenance of routes to prevent soil loss and damage to vegetation is possible. Off-road vehicles are allowed only on designated routes, in accordance with Forest Plan direction. The following areas will provide semiprimitive motorized opportunities:

- Squaw Creek - Murphy Creek area, Salt River Range
- Little Greys – Blind Trail Creek area
- Meadow Creek - Three Forks Creek area, Salt River Range
- Lake Barstow, Salt River Range
- Ridge Creek and closed road system north of there, Wyoming Range

Specific routes (both existing and potential) are found on Map 3.1, desired recreation settings.

Semiprimitive nonmotorized and primitive backcountry recreation settings (summer and fall only; this is not to suggest where snowmobiles will be allowed) are listed below.

- Salt River Range between Bear and Corral Creeks.
- Salt River Range, Corral Creek to Sheep Pass.
- The core area of the Grayback roadless area, upper end of the Little Greys River, North Fork of Sheep Creek, and the Mt. McDougal area.
- Northern Salt River Range from Stewart Peak to Sherman Peak, Pearson and Henderson Creeks.
- Southern Wyoming Range from McDougal Gap to Mt. Coffin
- Bradley Mountain area
- Middle Ridge

Winter recreation settings and opportunities

The desired condition is a mix of opportunities for skiing, snowmobiling, and snowshoeing, with the major access point continuing to be at the Greys River entrance near Alpine. Snowmobiling will occur on well-groomed trails (Alpine to Box Y), trails that get occasional grooming, and those that are marked but not groomed; there will continue to be opportunities for general backcountry off-trail use except for small areas of winter big game range (existing closures near Alpine and at Forest Park feedground

will be continued). Opportunities for skiing and snowshoeing are somewhat limited but the lower Greys River Road, Gillis Flat and Mill Hollow provide some close-to-trailhead areas; for those with snowmobiles or who can rent them, snowmobile access to backcountry skiing is without limit.

Safe and enjoyable groomed trails give access to destinations and play areas. Crucial winter ranges for big game are protected, while leaving as much terrain as possible open to winter recreation use. Serious hazards do not exist on groomed, marked trails or destination areas such as rental cabins. Shelter for emergencies is available at all forest guard stations and they will continue to be available for public rentals. Warming huts at Blind Bull and Poison Meadows offer additional emergency shelters.

Although snowmobiling by private parties is the major use in the area, opportunities for other uses are provided, including guided snowmobile or snow coach trips, cross-country skiing, and snowshoeing.

Facilities and Recreation Uses

Developed recreation

Facilities for day use, group use, visitor orientation and interpretation are provided mostly near the north end of the river corridor along the Greys River Road. Backcountry access and primitive dispersed camping are available throughout the drainage, as well as along the Little Greys River.

Guard stations are available as rentals to the public when not needed for administrative uses.

Adequate trailhead parking and signing is in place for current and anticipated levels of use. Trailhead facilities are consistent with the ROS setting they serve and the maintenance and use level of the trails they serve.

Centralized facilities for users are provided up and down the river. Facilities could include RV dump station, water, garbage disposal.

Suitable sites for reservation by large groups (up to 100) for day use or camping exist in desirable locations.

Developed recreation facilities and structures are defensible against fire.

Visitor Information Services

Increased Forest Service presence exists in the drainage during high-use periods. Continue to rely on recreation permittees and volunteer hosts to give information; continue with information signs and map distribution boxes.

Developed trailheads

Trailheads are no larger than necessary to meet the need for trail access; they are designed to be compatible with the setting and to orient visitors, and most will include a parking area, directional signing, informational signing if needed, and some will have hitchrails or other facilities. Most of the undeveloped trailheads have no needs for construction; those which have been identified for development or better facilities are listed in Chapter 4 (management opportunities).

Dispersed Recreation

Resource damage along the rivers from dispersed recreation and vehicle traffic is kept to a minimum, without the need to close opportunities for dispersed camping in desirable locations.

Opportunities to camp along roadsides and next to rivers will continue, with individual campsites managed to be sustainable over time. Weeds will not be allowed to take over these sites.

Public desire is met for semiprimitive recreation in the backcountry areas most suitable for that use - large, remote, natural areas with links to adjacent backcountry and a good trail system, with high scenic quality and attractions.

Backcountry trails serve needs of visitors. Low-use trails are narrow and primitive and may lack drainage structures if compatible with the remote and primitive settings where they are found. Higher use trails are maintained with drainage structures, bridges, and other structures if needed to accommodate use and protect soil and vegetation.

OHV users will be served by a trail system that reduces the potential for violations and resource damage while meeting their desires to the extent possible. A designated road and trail system that complies with Forest Plan direction reduces resource impacts – soil erosion, damage to wet meadows, wildlife disturbance, noxious weed spread, and damage to cultural resources.

Suitable routes for off-highway vehicles will continue to be part of the state OHV trail system and funds collected from registration fees will continue to be used for improvements, signing, and patrols.

OHVs will stay on designated routes.

Outfitter-guides will continue to offer services in the area at the same level as they currently operate. Hunting, summer pack trips and day use, and winter snowmobiling will continue; there may be opportunity for additional uses subject to completion of an analysis of public need.

Inventoried Roadless Area Management

At Forest Plan revision, we will be making recommendations for further wilderness designation forest-wide, and there will be an analysis and public involvement process for

going through the suitability determination and making recommendations to Congress. The southern Salt River and upper Little Greys River, contiguous with larger roadless areas, are both attractive candidates for possible designation, either as wilderness or "backcountry," which would allow for the continued mix of uses that is currently found. For the purposes of this analysis, desired condition for the roadless areas is based on the assumption that most people desire the current mix of uses and not much change from existing conditions. This means we would manage roadless areas essentially as they are, with most of the backcountry in a non-motorized primitive setting and some designated routes remaining available for use of motorized trail vehicles. No change in winter use is recommended; all of the roadless areas are open to snowmobiling.

Recommended changes to Forest Plan DFCs

In mapping existing and desired settings for the Greys River watershed, some issues became evident. If we map existing ROS settings, and then desired conditions based on public comments and the assumption that people want similar opportunities to what currently exist, we have a conflict between these and the Forest Plan land allocations that call for substantial change in the setting, especially where existing primitive and semi-primitive areas have been mapped as DFC 1B.

Implementing DFCs shown in the Forest Plan, with the dominant ROS settings each implies, would fragment large backcountry areas and reduce the linkages and landscape flows that currently exist. Several large semiprimitive and primitive areas, including drainages identified in this analysis as high-quality backcountry, are mapped as DFC 1B in the 1990 Forest Plan. If we assume that the dominant landscape in DFC 1B (and to a certain extent, DFC 10) is roaded, with most collector roads open and timber harvest evident, then the setting in much of these DFCs will be roaded, with the scenic quality modified. The effect will be to change the physical setting for many areas currently within the primitive and semiprimitive settings. Expansion of roaded settings into what are currently remote semiprimitive areas would result in backcountry being confined to the highest elevations and more homogeneity in the recreation settings offered.

Semiprimitive motorized experiences are few in this watershed; the terrain and soils are not suitable for OHVs and trail bikes in many areas. Many of the trails that are currently open to vehicles are not especially suitable or easily used by them. Because the SPM class makes up such a small part of the study area and replacements for it are few, it seems important to retain some, taking advantage of areas best suited for that use. But some areas mapped as DFC 2B in the 1990 Forest Plan are not suitable or sustainable for motorized use; similarly there are places not shown as DFC 2B that might be. This again serves to highlight the need to revisit the travel management plan.

DFC 2A (backcountry recreation use, non-motorized) was developed to highlight those areas most suited for this kind of use. However, the way it was mapped in the 1990 Forest Plan, DFC 2A is largely confined to the high, steep areas on the east slope of the Salt River Range, far from trails or places that people actually recreate. Some areas of DFC 2A coincide with areas identified as high-quality backcountry, but the DFC 1B in the lower two-thirds of these drainages eliminates much of the reason they were

identified as high quality to begin with. DFC 2A should coincide with areas of high-quality backcountry recreation and include those trails that give primary access to them. Seven general areas are included in the discussion of desired primitive/semiprimitive non-motorized areas above; they are also mapped.

DFC 3 extends up the Greys River corridor to Three Forks Creek. Since the entire river has been studied and recommended as a National Recreation River, it would make sense to include the upper drainage in DFC 3. Other eligible wild/scenic rivers could be mapped with DFC 3 corridors also. See Map 3.1 on the following page for an illustration of the desired changes.

Map 3.1

Gap Between Existing and Desired Condition

Heritage

Many heritage resources are as yet not included in any inventory. A number of those that are recorded are in deteriorating condition. While some interpretive signing has been created on the district, further interpretation could benefit forest resources by increasing understanding of and interest in the area's heritage.

Watershed Function and Aquatic Habitat

Inventory and monitoring deficiencies make many management decisions scientifically uncertain. Management plans across resource areas need to better incorporate watershed issues. This includes travel management, which is expecting to undergo a number of changes in the near future with the increased OHV use. Sediment control on major roadways needs to be addressed in a consistent manner. Also timber and range plans especially in subwatersheds rated at "non-functioning" need to include mitigation measures.

Vegetation Management

Understory Vegetation

Grazing impacts continue to require increased management to assure that riparian areas and high ridgelines are restored to resiliency. Streambanks and soil conditions need to be evaluated and included in management planning. Non-native invasive species will also need a continued focus to contain or eliminate current populations as well as to restrict any new populations from developing.

Timber Resources

The majority of the forested vegetation in the Greys River drainage is 100 years of age and older. With these older age classes of trees dominating the area, mortality within the timber stands is prevalent. The forest interdisciplinary team completed an analysis of the vegetation in this area to see if it was in a Properly Functioning Condition. It was very evident that the Greys River forested vegetation falls outside the range of Properly Functioning Condition. A balanced range of structure classes does not exist.

The area contains extensive acres of heavy fuel loading that are subject to catastrophic wildfire. The timber stands are highly susceptible to insect and disease activity. Forest restoration efforts should include the use of timber harvest followed by establishment of a young forest. Prescribed fire should be used as a tool to reduce fuel loading and aid in the establishment of new age classes in those timber stands where timber harvest is impracticable. A combination of timber harvest and prescribed fire should be used where it is ecologically feasible and makes sense to combine the tools to create new age classes of the desired tree species. The development of the younger tree age classes will result in timber stands which are more resilient to the many demands likely to be made on this area in future years. This restoration activity will maintain the forested vegetation in a properly functioning condition.

The vegetative treatment goal to become Properly Functioning for the Greys River drainage is as follows:
Lodgepole Pine = treat 4,260 acres now + 3,134 acres over the next decade = 7,394 acres to treat.
Douglas-fir = treat 8,255 acres now + 3,136 over the next decade = 11,391 acres of treatment.
Engelmann Spruce = treat 3,893 acres now + 1,390 acres over the next decade = 5,283 acres to treat.
Subalpine fir = treat 3,098 acres now + 1,203 acres over the next decade = 4,301 acres to treat.
Whitebark-Limber = treat 2,957 acres now + 777 acres over the next decade = 3,734 acres to treat.
Aspen = treat 3,075 acres now + 883 acres over the next decade = 3,958 acres to treat.

The Greys River watershed is composed of three main sections. They are the Lower Greys River, Middle Greys River and Upper Greys River. These areas are all in need of restoration treatment. With the recently improved transportation infra-structure located in the Middle Greys area, it would be desirable to prioritize this area for treatment. This area is comprised of the following 5th-level HUCs: Greys River-Deadman Creek, Greys River-Blind Bull Creek, North Fork Sheep Creek and Greys River-Bear Creek.

Fire
The suppression of fire has changed the landscape in many ways. New changes to Forest policy will allow fire to again take its place in creating healthy diversity across the landscape. Managers of wildland fires will need to remember, however, that extreme conditions have been created by ongoing suppression. As fire is gradually reintroduced, managers will need to be cautious regarding the potential of fires to grow larger or more rapidly than may have been the case historically.

Wildlife
Some obvious landscape scale problems exist in some wildlife habitats, including the decline of aspen and whitebark pine. In the conifer habitat types, there is a growing imbalance in age classes and increasing instability due to the cumulative effects of fire suppression. The instability in the conifer forest zone is being generated by insect and disease activity, and the resulting landscape scale buildup in fuels capable of supporting very large, severe wildfires. There is a general need to reintroduce fire as an ecological process in order to arrest the decline in habitats, provide for age class diversity in the common conifer types, and curb the growing potential for major wildfire conflagrations.

There is a need to include mechanical treatments, where land use allocations permit, in order to make the reintroduction of fire under controlled conditions feasible in many situations. Mechanical treatments are often needed to modify fuels to achieve desired post-fire vegetation structure and composition. Mechanical treatments alone can sometimes be used to meet vegetation and habitat objectives.

At the species level, information is generally lacking to determine population trends and

relationships to forest management activities. A long term commitment of resources is needed to implement a useful wildlife monitoring program. This needs to be focused on a limited number of readily monitored species that are effective indicators of conditions in selected keystone habitats. In addition to "indicator" or "focal" species, there is a need for effective monitoring of wildlife of management concern, including T&E, R4 Sensitive, and economically important species.

Recreation

Travel management

"Desired condition" is a sustainable, desirable system of designated trails and roads that are open to various kinds of vehicles. Current condition is one of unmanaged OHV use and frequent violation of travel restrictions. This is causing a proliferation of user-created trails that are not properly designed or located. We are not managing the public use of OHVs in a manner consistent with Forest Plan direction, land capability, and public safety and enjoyment by all Forest recreationists. We need to provide better public service by giving clear direction on where motorized use is allowed and designing a trail system that reduces the potential for violations and resource damage while meeting user needs to the extent possible.

We also need to update the existing travel map, showing new routes suitable for OHV use and removing some that are currently shown as open but which are basically impossible to find. There is a need for more field presence for visitor contacts and law enforcement as well as continued coordination with the state on marking the state OHV trail system.

There is a need to provide opportunities for off-road vehicle use where it does not cause damage to soil, watershed, or vegetation and where it does not displace wildlife or non-motorized recreation users.

Condition of facilities, including recreation roads and trails

Most developed sites are in satisfactory condition but annual maintenance and cleaning has dropped off in the past few years. Of particular concern is the condition of garbage facilities and the frequency of garbage removal. There is also a need for durable, sustainable sites for large parties to reserve for events such as family reunions; at least two places capable of handling about 100 people have been tentatively identified.

Potential effects of nearby developments and regional influences

The desired condition of keeping the Greys River area essentially as it is, with few use restrictions and opportunities for dispersed recreation in an uncrowded, rustic setting, may become more difficult to attain as the population of the general area increases and more people seek opportunities on the national forest. Already we are seeing a proliferation of user-created two-tracks and vehicle routes in places being managed for non-motorized recreation; heavy use of some roadside camp areas has caused damage to streamside vegetation and soil; on popular weekends the best dispersed roadside camps are taken, many of these by visitors who aren't even using them but have left their trailers in the area for the season. Traffic has increased on the Greys River Road, as has

its speed since the road was improved in 2000.

As more private land at the margin of the forest is developed for vacation homes and residences, the so-called urban-interface will continue to be a concern near Alpine. Of particular concern in that area is the potential for fire. There is also the potential for similar issues in the Deadman Ranch/Box Y area if those properties sell to developers.

Compatibility of some potential forest projects with desired ROS settings

In summary, we have identified some high-quality primitive recreation areas that coincide with areas included in the timber base in the 1990 forest plan. If we choose to enter these places for timber harvest, we will change the recreation setting permanently. See suggested changes to Forest Plan land allocations below intended to prevent this.

Condition of inventoried roadless areas

Past activities, some planned activities, and some user-created roads and ATV trails could change the roadless character of some areas and be incompatible with desired condition. So far these problems are minimal.

CHAPTER 4
MANAGEMENT OPPORTUNITIES

Introduction

The team approached the integration of management opportunities with an awareness that limited budgets will require a prioritization of projects that contribute to several resource areas at once, and/or projects that pose the fewest conflicts with differential effects on various resource areas. In many cases, more information is needed to make informed decisions on alternative management approaches, and those information needs are described in detail in this section. Where discrepancies exist between desired conditions and the current Forest Plan direction, resource specialists have also recommended changes to the Forest Plan. Because the BTNF is beginning the process of updating its Forest Plan, these changes can likely be evaluated during this process rather than by a Plan Amendment.

The arrangement of opportunities therefore includes up to three categories within each resource area:

- Forest Plan Recommendations
- Inventory and Monitoring
- Field Projects and Planning

These categories are carried through each resource area in the narratives immediately following this introduction. At the end of the chapter, each category is given a table of recommendations, without reference to resource area. This represents the reality that many recommendations are able to move multiple resources toward desired conditions simultaneously.

For planning purposes, the Greys River Watershed can readily be separated into Upper, Middle and Lower divisions, as shown with Map 4.1 on the following page. The Upper Greys River is a complex area. It encompasses areas with a lot of earlier timber activities such as East Fork and Shale—Kinney Creeks. A major fire from 1988 at Corral Creek has also provided timber opportunities. Lodgepole pine cover types predominate in the Upper section. On the Salt Range (west) side, unroaded backcountry areas are also an attraction, such as Crow and Dick Creeks. The Wyoming Range National Recreation Trail wanders along the ridges above former harvest areas on the east side of the watershed. The main road along the headwaters of the Greys River runs in the riparian zone, but possible reroutes have been difficult to find.

Map 4.1

The Middle Greys River Watershed offers the most opportunity for integrated resource condition outcomes. Road improvements have alleviated major issues for watershed and fisheries resources. Vegetation treatments including returning fire to an active role and timber activity can address habitat conditions for a number of species. Transitional elk habitat is an issue in this section of the watershed. The elk feedground at Forest Park has created some impacts which can be addressed by prioritizing the Middle Greys. The private property inholdings at the Box Y Lodge and Deadman Creek can also be better protected from fuels buildups with active vegetation management creating some fuels breaks in the dense Douglas fir cover type prevalent in the Middle Greys. Creating more opportunity for aspen regeneration has also emerged as a common theme across resource areas.

Heritage Resources

I. Inventory and Monitoring

Purpose and Need

Very little of the assessment area has been inventoried for heritage resources. Prehistoric and historic sites throughout the assessment area are exposed to erosion, structural decay, livestock grazing, recreation, and management neglect.

Develop a strategy and schedule to inventory portions of the assessment area for heritage resources. Focus on areas where heritage resources are most likely to occur and/or where areas are susceptible to damage from natural erosion or high use recreation areas. All proposed management activities will be inventoried prior to implementation.

Purpose and Need

The evaluation process identifies which sites warrant protection and preservation. Significant heritage resources may be lost if no actions are taken.

Evaluate all prehistoric and historic sites within the assessment area for significance and eligibility status for listing on the National Register of Historic Places. Maintain the eligibility status of eligible sites or sites listed on the National Register.

Purpose and Need

Traditional use areas (referred to as Traditional Cultural Properties in the Regulations) may or may not have artifacts associated with them and that often makes them difficult to identify and protect. If so requested by the Tribes, the Forest will work with individual tribal governments to further identify and address Native American traditional uses of Forest land as is outlined in the federal legislation.

While working with Tribal Governments in accordance with Executive Order 13084 (dated May 14, 1998), *identify specific locations where Tribal Governments could be granted access for the purpose of traditional plant gathering, pole gathering, or gathering other items needed for traditional uses*.

II. Field Projects

Purpose and Need:

Many historically significant and potentially significant structures within the assessment area are in a deteriorated condition. If no actions are taken, these heritage resources will be lost. There is local interest and support in ensuring these resources are stabilized, restored and made available to the public.

Stabilize and restore structures at significant historic sites and provide interpretation of those Sites or other sites that have interpretive potential. An example would be historic guard stations and fire lookouts.

Watershed Function and Aquatic Habitat

WATERSHED

I. Inventory and Monitoring:

Purpose and Need

To lay the foundations for scientifically prioritizing work and requesting the required funding for projects on the ground, data is still needed.

a) *Review the Inland West Watershed Assessment data*; *identify problem areas* along with restoration measures, and identify funding priorities for the Forest annual program of work.

b) *Establish reference stream reaches* within the Greys River Watershed to assess watershed condition using Wyoming DEQ beneficial use reconnaissance project protocols.

c) *Conduct hydrologic functional analysis* on entire watershed.

d) *Conduct inventory of historic sheep driveways and develop reclamation plans*.

II. Field Projects and Planning

Purpose and Need

To improve watershed condition in subwatersheds identified as being non-functioning hydrologic units.

Update and/or review allotment management plans in Deadman, Lower Long Gulch, Meadows, McCain, Murphy and Three Forks Creeks.

Purpose and Need

To address watershed stability and water quality protection.

a) *Develop vegetation management plans* including timber and prescribed fire.

b) *Incorporate sediment abatement requirements* in road management objectives and maintenance levels and/or relocate road sections where quality is impaired.

c) *Revisit the Bridger-West Travel Plan*. Maintain, or close/restore roads as needed.

AQUATIC HABITAT

I. Inventory and Monitoring

Purpose and Need

Goal 2.1 of the Forest Plan calls for maintaining adequate habitat for wildlife and fish, goal 3.2 calls for recovery of Endangered species, and goal 3.3 seeks to prevent sensitive species from becoming federally listed.

In order to meet and maintain the fishery at or near potential, *stream habitat inventory needs to be kept current at a 5 or 10 year rotation* to identify issues and opportunities.

Streambank Stability

Purpose and Need

To assist other resource managers in achieving the Forest Plan Guideline of 90% of natural streambank stability.

Update R1/R4 Stream Inventory and maintain the database.

Threatened, Endangered, and Sensitive Species Surveys

Purpose and Need

Forest Plan goals call for recovery of Endangered species (Goal 3.2) and preventing sensitive species from becoming federally listed Threatened species (Goal 3.3).

Maintain a 5-10 year stream inventory rotation and database to identify issues and opportunies to improve habitat.

II. Field Projects and Planning

Fish Passage

Purpose and Need

Forest Plan Standard provides for fish passage of all live stages of fish and aquatics. *Road and trail maintenance* should be kept current to reduce sediment from entering streams, and *culverts should be maintained* to prevent blockage. Culvert survey should be updated.

Cutthroat Trout Habitat

Purpose and Need

WG&FD currently manages the Greys River and tributaries for natural recruitment of native cutthroat trout which meets the Forest Plan Guideline.

Vegetation

Understory Vegetation Communities

General

There are abundant opportunities for management to improve the health and stability of grass, forb, shrub and soil resources in the Greys River watershed. Those activities that will provide the greatest benefit to the resources of the watershed include:

a) *seed and stabilize soils*.

b) *restore periodic fire events*.

c) *develop and implement up-to-date grazing allotment management plans*.

d) *complete an accurate, small scale (1:24,000) range vegetation inventory and corresponding G.I.S. data base*.

e) *establish permanent upland and riparian monitoring points to help determine condition and trend of vegetation and soil resources*.

I. Inventory and Monitoring

Purpose and Need

To minimize impact in areas of greatest concern, along high ridges in sheep allotments and bottom/riparian areas in the cattle allotments.

a) A substantial benefit would be realized through changes in allotment management plans and the management of permitted livestock. Some of these changes may require updated analysis to identify specific locations where resources are not in desired condition. In some instances permittees are managing their livestock to minimize use in these areas. In the majority of sheep allotments, management practices need to be changed to *keep sheep in the lower and mid-slope portions of the allotments* where grazing has typically been very light. Likewise, grazing management on the Big and Little Greys cattle allotments needs to concentrate on *limiting use in wet meadows and river areas.*

b) Even the best allotment management plan will be of limited use if it is not implemented appropriately. Unfortunately, grazing permittees do not always adhere to their management plans. Livestock are grazed at times and/or locations where they are not authorized. *Range monitoring by the permittees* would help reduce the amount of unauthorized grazing. This, combined with *aggressive inspection and follow-up action by Forest personnel* would create additional incentives for permittees to follow their allotment management plans and the terms and conditions of their grazing permits.

c) As more scrutiny is focused on Forest Service activities, it has become crucial that decisions be based on sound science and accurate interpretation of physical and biological conditions. Data on range and riparian vegetation condition and trend in the Greys River watershed is extremely limited. Most available information is over thirty years old, is limited in spatial area and is not in a readily usable form. The value of an analysis of this watershed that relies on currently available information will be limited. Therefore, *completing an inventory of range (understory) vegetation communities and soil conditions* throughout the Greys River watershed would not only be valuable but may be necessary to conduct an accurate analysis. In addition, *permanent and temporary monitoring transects should be established in both upland and riparian areas*. Monitoring should be implemented to collect both short and long term data. This data would be used to verify compliance with permittee annual operating instructions as well as to gain long-term trend information about vegetation and soils.

II. Field Projects and Planning

Purpose and Need

To stabilize soils in those areas where livestock grazing has combined with other activities and natural processes to expose unnaturally large areas of bare soil. Such areas extend from Poison Meadows on the south, north along the top of the Salt River and Wyoming Ranges to Mount Bradley and Grayback Ridge. Although revegetating these areas will be slow due to degraded soil conditions and very short growing seasons, direct efforts to *increase ground cover* could be effective in localized areas.

Purpose and Need
To decrease woody species and promote grass species that may increase soil protection and improve wildlife habitat.
Reintroduce or allow natural fire in the Greys River watershed. This would be expected to change the vegetative structure and species dominance in burned areas, depending upon the characteristics of each site.

Purpose and Need
To minimize impact in areas of greatest concern, along high ridges in sheep allotments and bottom/riparian areas in the cattle allotments.

a) *Review existing management plans* for allotments. Only Bailey Lake, Bear Wallow, Elk Mountain, North Middle Ridge and Snake River allotments have up-to-date management plans. The remaining allotments would benefit if grazing schedules were changed to allow more frequent rest periods. Doing this may require that grazing be permitted in areas now vacant or closed to grazing, or reducing the number of permitted livestock.

b) *Complete NEPA* to determine the feasibility of authorizing grazing in the now vacant, Birch Creek-Star Peaks and White Creek-Man Peak allotments.

c) *Restore riparian area* in vicinity of Forest Park Feedground.

d) *Reconstruct fences* or limit livestock use in the north side of TriBasin Divide. Consider revegetation efforts to begin stabilizing soil. to keep the species that are present from spreading, or reduce the number of affected acres, through aggressive control methods and proper vegetation management.

<u>Non-Native, Invasive Species of Plants</u>.
Purpose and Need
To keep the species that are present from spreading, or reduce the number of affected acres, and to prevent other weed species from entering the drainage.
a) Management and grazing strategies will take into account the presence of these species and will be designed to discourage their growth, and to encourage the proliferation of more desirable plant species. Aggressive control methods may be needed to curtail the spread and dominance of these species in specific areas. *Mechanical, chemical and biological treatments should be used where appropriate.* The primary treatment along roadsides would likely be chemical. Many weed infestations exist in locations where chemical control is not feasable. Depending on the plant species, biological agents may be the only practical control option.

b) Management efforts should also include such avenues as the current *certified weed-free hay policy and provisions in construction and timber harvest contracts* to prevent seeds from entering the National Forest on equipment and trucks .

Timber Resources

Field Projects and Planning

Proactive Role - Management Opportunities to Shape Future Vegetation

Purpose and Need

To allow for diversity of successive stages of vegetation types.

Much of the present regeneration is moving into the young forest structure stage. There are no stands of stand initiation stand structure being created, except by wildfire. Future action alternatives and *future harvesting* will help produce a balanced range of stand structures (to include grass/forb and seedling/sapling).

Purpose and Need

To produce larger blocks of vegetation that more closely resemble landscape patterns of patch size and shape, distribution and connectivity for the lodgepole pine subject area to Properly Functioning Conditions.

Past harvest treatments were limited to a maximum of 40 acres; new even-aged treatment could, over the long-term, create PFC. Removal of adjacent "Leave Patches" would reduce the biological contrast between stands. Lodgepole pine age classes of 25-40 year old trees now border age classes of 101-200 year old trees; tree heights of the 25-40 year old trees are 15-35 feet in contrast to the 101-200 year old trees which are 80-100 feet in height. *Conversion of leave patches to stand initiation* would improve landscape patterns where harvest has already occurred.

Purpose and Need

To break up contiguous stands of trees and mimic pre-settlement conditions; will provide habitat for early seral vegetation and increase the overall diversity of vegetation.

In light of fire suppression and lack of disturbance regimes, *timber harvest* will provide necessary Created Openings. The short-term harvest-related sediment delivery resulting from timber harvest is considered "inconsequential" (Western Watershed Analysts, March 9, 1999). Soil compaction from heavy equipment may be adverse if operations occur during wet, saturated soil conditions. Peak water flows, water yields, and effects on water quality and stream channel stability from removal of forested vegetation may be undetectable (Western Watershed Analysts, April 30, 1999). Long-term effects of timber harvest are harder to assess. Some will be positive and others negative.

Purpose and Need

To implement the Forest Plan and improve forested conditions by moving portions of older vegetation to stand initiation structure.

Using timber sales as a tool will improve utilization of wood products; improve forest health; increase vigor of timber stands by reducing dwarf mistletoe and its spread; provide jobs and economic benefits to local communities. Creating firewood-gathering sites, using timber sales as the tool, will enhance firewood gathering opportunities.

Purpose and Need

To move the Greys River Landscape area timber resources into Properly Functioning

Condition (PFC), as described by species, below, and detailed in Appendix D.

Summary of Needed Treatment to be Properly Functioning Today

Treatment needed today
Create 4,260 Acres Lodgepole Pine Stand Initiation
Create 8,255 Acres Douglas-fir Stand Initiation
Create 3,825 Acres Engelmann Spruce Stand Initiation
Create 3,097 Acres Subalpine fir Stand Initiation
Create 2,957 Acres Whitebark-Limber Pine Stand Initiation
Create 3,315 Acres Aspen Stand Initiation
Total 25,709 Acres

Summary of Treatment Needed to be Properly Functioning Over Next Decade

Create 3,134 Acres Lodgepole Pine Stand Initiation over the next 10 years
Create 3,136 Acres Douglas-fir Stand Initiation over the next 10 years
Create 1,394 Acres Engelmann Spruce Stand Initiation in next 10 years
Create 1,202 Acres Subalpine fir Stand Initiation over the next 10 years
Create 777 Acres Whitebark-Limber Pine Stand Initiation in next 10 years
Create 883 Acres Aspen Stand Initiation over the next 10 years
Total 10,526 Acres

Note: These numbers are the best that can be humanly derived. They are approximate averages. To reach this point, a minimum of 9,713,264 numbers were calculated. Detailed and specific "Location and Site" data (with associated maps) is available to analyze for the "plan implementation" stage for the NEPA process. This information will aid in exact location of projects and will aid in selection of methods to achieve the desired outcomes.

This data and the associated maps are contained in the Bridger-Teton National Forest FSVEG data base.

Fire

Field Projects and Planning

Purpose and Need

To move the fire-adapted ecosystem in the assessment area within the historic range of variability. Emphasize restoration of declining vegetation types, especially aspen and whitebark pine, and wildlife habitat for species of management concern.

Develop a 5-year program for treatment of these sites which integrates fire, grazing, recreation and other resource needs. Identify areas where management ignitions and natural ignitions ("fire use") can be successfully managed for resource benefits. Resource management objectives include maintenance and enhancement of habitat for T&E, Sensitive, Management Indicator, and other native species; avoiding development of vegetation conditions that promote extensive insect and disease outbreaks; reducing fuel loading to curb potential for adverse effects on resources, improvements, and private property from large wildfires; improving forage conditions for domestic livestock and wildlife; maintaining fire-dependent plant and animal communities. Integrate management of invasive species.

Wildlife

General

To manage Greys River landscape area vegetation within a range of variation consistent with historical succession and disturbance regimes. The broad-scale strategy should be based on a comparison of historical and current ecological processes and landscape patterns, such as age-class distributions and patch size characteristics (Ruediger et al. 2000).

Opportunities described in this section are those most likely to move the wildlife resources towards the desired future conditions. Some opportunities identified would be best accomplished at a Forest-wide scale, including some best accomplished during Forest Plan revision.

I. Forest Plan Amendment Recommendations

Big-game security

Purpose and Need

Managing for security habitat is difficult without a clear definition. Maintaining secure habitat is essential to providing suitable and adequate habitat to support the game populations established by the WGFD, as agreed to by the USDAFS (Forest Plan Goal 2.1, objective 2.1(a)).

Evaluate and revise cover and security area definitions in the BTNF Land and Resource Management Plan during forest plan revision. The BTNF security area definition does not include parameters for size of the area, distance from open roads, or vegetation characteristics. Hillis et al. (1991) offers parameters for area, roads, and vegetation.

Snag Management

Purpose and need

Snags are an important habitat component; they provide foraging and nest sites for several USDAFS sensitive species and a host of other species.

Review the LRMP's snag management guideline. Is it being practiced, and is it sufficient to provide habitat for snag dependent species? A mixture of snag species and diameters should be maintained for diversity. Recommended snag patches should be 5 acres or more in size and well distributed. Smaller snag patches and individual snags are also retained as opportunity permits. The snag patch guideline should be evaluated to ascertain its effectiveness and amended if necessary.

II. Inventory and Monitoring

GIS Databases

Purpose and Need

An accurate vegetation survey would greatly aid range, wildlife, and other resource management activities. Inaccurate data and incomplete datasets for many of the Forest's GIS coverages limit their usefulness. The Forest's current vegetation database was created in 1988 and has a timber emphasis. All shrubland and grassland vegetation types are lumped into a single non-forested class.

Accurate databases are of infinite value; they aid environmental analyses, facilitate Freedom of Information Act requests, enable professional quality displays, allow for habitat suitability and alternative modeling, etc. Some examples of current problems are:

the roads coverage does not include all roads, and attribute data are incorrect; attribute data in the ownership coverage are not accurate; and the vegetation layer is of little value for other than forest types.
Implement a vegetation inventory and develop vegetation GIS coverage. This should be done through remote sensing and image classification to produce a cost-effective credible coverage, but field verification would be very desirable. A vegetation inventory should be part of a Forest-wide effort. The Forest's existing corporate database should be updated and maintained within accepted accuracy standards. The development of additional coverage themes is also important but is of secondary importance.

Purpose and Need
To protect elk calving areas from human activity from May 15 to June 30.
Identify all elk calving areas. Roads and trails through elk parturition range should have seasonal restrictions to protect calving area integrity.

Purpose and Need
To provide necessary data for proactive management of Canada Lynx population.
Relationships between snowshoe hare populations and forestry practices need to be determined through monitoring to ensure timber final harvest units cycle back into "suitable" lynx habitat. "Suitable" lynx habitat is capable of supporting snowshoe hares over winter. If snowshoe hares cannot in fact become reestablished in timber harvest units in lynx habitat, future timber harvest will be limited by the "currently suitable" habitat standard in the Forest Plan lynx amendment**.**

Threatened, Endangered, and Sensitive Species Surveys
Purpose and Need
Forest Plan goals call for recovery of Endangered species (Goal 3.2) and preventing sensitive species from becoming federally listed Threatened species (Goal 3.3).
Little information is available on many of the listed species capable of residing within the Greys River watershed. Databases such as the WGFD's Wildlife Observation System and the Nature Conservancy's Wyoming Natural Diversity Database contain primarily opportunistic observations, and are not definitive regarding species presence or absence. The probability of breeding sites for some listed species is high. Formal surveys would provide more reliable and defensible data on species presence or absence than opportunistic observations.

a) *Perform surveys* for the Threatened, Endangered, and Sensitive species where little information is available. Surveys should be prioritized by those species most likely to occur within the watershed. Many species can be included in a single survey for efficiency, such as one survey for owls, another for forest carnivores (pine marten, Canada lynx, fisher, and wolverine). Surveying cliff sites for peregrine falcons and spotted bats may also be performed concurrently.
b) *Implement an inventory survey for rare amphibians*-- western boreal toad (*Bufo boreas boreas*) and northern leopard frog (*Rana pipiens*)--*and monitor breeding sites for all amphibians*. There are no records of leopard frogs or boreal toads in the Greys River District (Patla 2000); boreal toads have been observed within the Alpine town limits (T.

Bills pers. comm). Once widespread and common, many amphibian species have experienced dramatic population declines. Additional amphibian species are likely to be listed as USDAFS sensitive species and/or petitioned for Endangered Species Act listing. As with many amphibian species, Columbia spotted frogs have experienced sharp population declines in parts of their range; including localized declines in parts of northwestern Wyoming (Patla 2000).

c) *Ascertain boreal draba distribution*, including condition and trend of the populations. All sensitive plant populations should be monitored to document trends.

III. Field Projects and Planning

Vegetation Management

Purpose and Need

Goal 2.1 of the Forest Plan calls for maintaining adequate habitat for wildlife, goal 3.2 calls for recovery of Endangered Species, and goal 3.3 seeks to prevent sensitive species from becoming federally listed. Vegetation management is necessary to maintain and enhance habitat capable of supporting sustainable wildlife populations. Vegetation treatments can benefit the recovery of threatened and endangered species.

a) *Maintaining the aspen and whitebark pine types*, in all seral stages from regenerating stands to old stands with large diameter trees, provides habitat for many species.
b) Design silvicultural prescriptions to give greater emphasis to retention of live and dead trees and coarse woody debris, which are important habitat components (Ruediger et al. 2000). *An average of 60 acres per section are retained and unavailable for timber harvest or firewood cutting*. Timber management that is compatible with abundant small mammal populations that provide a prey base for a number of rare and common species. A wide range of silvicultural practices that include uneven-age as well as even-age regeneration systems will be necessary. Regionally, standard silvicultural practices may need to be modified to best serve local species, local conditions, and resolve local problems. Natural regeneration of mixed species is emphasized, rather than monotypes. In snowshoe hare and lynx habitat, new stands established at final harvest may include extensive patches of dense regeneration rather than only widely spaced trees. A mixture of snag species and diameters is maintained for diversity. Existing snags and currently live replacement snags are maintained across the landscape in patches of 5 acres or more in size, but also in smaller patches or as individual trees, depending on site opportunity and characteristics of available trees. Snag recruitment and retention takes firewood collection into consideration. A greater number of snag and replacements may be needed where road access makes felling of snags for firewood likely. Where open road density is high, access may be managed to retain snags.

Canada Lynx Habitat Management

Purpose and Need

To provide necessary data for proactive management of Canada Lynx population.
Further refine the "lynx habitat" definition so that conservation efforts are directed at areas where they will benefit the species. The current definition includes all conifer forest

types, aspen, and willow, at all elevations. However, in this area lynx are primarily associated with boreal forest above 8000 feet elevation. Other factors that may be important, including slope and snow depth, were not considered. Management should be focused on areas with potential to maintain or enhance snowshoe hare populations and lynx, rather than the entire forested zone. Although lynx will use alternate prey, they thrive only where there are adequate numbers of snowshoe hares.

Winter travel management

Purpose and Need

A travel plan is needed to implement the Forest Plan's Habitat Effectiveness Standard ("access will be regulated to protect such important big game habitat components as crucial winter range"), Big-Game Winter Range Standard ("activity and disturbance in crucial big-game winter range will be restricted from November 15 to April 30 if big-game are present"), and the snow trail location guideline ("trails should be located to avoid areas of high avalanche hazard and crucial wildlife winter ranges").

Creation of a winter travel plan for the Greys River watershed is recommended due to increasing snowmobile use and potential conflicts with wildlife.

Items to be considered in a winter travel plan include but are not limited to:

- Travel through crucial winter ranges remains on designated corridors.
- Coordinate with the WGFD, snowmobile clubs, and other parties to sign, educate, and enforce crucial wildlife winter range regulations.
- Human activity and disturbance in crucial big game winter range is regulated from November 15 to April 30 when big game are present in the area.
- Use Colescott and Gillingham's (1997) research on the impacts of snowmobiles to wintering moose as baseline information for periodic monitoring to assess current and future impacts from increasing snowmobile use.
- Human activity and disturbance are restricted in elk calving areas from May 15 to June 30 when elk are present in the area. Roads through elk parturition range have seasonal restrictions to protect calving area security.
- Potential wolverine denning habitat and snowmobile use patterns should be identified. Recommended standards and guidelines may become available in the wolverine conservation plan currently in development.

Large carnivore education

Purpose and need

Bears and mountain lions are important ecosystem elements, however, they do at times present safety concerns. There is potential for increased conflicts with bears as populations and their distribution change. The public is concerned with increasing mountain lion contacts. The educational programs give the public a better understanding and appreciation for all wildlife and helps people to live in harmony with large carnivores.

Continue bear and mountain lion educational programs. The programs presented in cooperation with WGFD and other partners have been well attended and valued by the public.

Big-game security

Purpose and Need

Maintaining secure habitat is essential to providing suitable and adequate habitat to support the game populations established by the WGFD, as agreed to by the USDAFS (Forest Plan Goal 2.1, objective 2.1(a)).

Decommission unneeded roads, particularly adjacent to concentrated human activity areas. Road densities should not be increased. New road construction for vegetation management activities is either closed to vehicle access or obliterated after administrative use.

Threatened and Endangered Species management

Purpose and Need

To create disturbances required by sensitive species.

Use prescribed fire to promote Payson's milkvetch population expansion; milkvetch populations may be unable to persist without disturbance. The Waterdog Lake population, in particular, will probably decline unless a disturbance creates new habitat; Fertig and Marriot (1993) reported individual plants of this population to be in poor condition.

Promote natural fisheries

Purpose and need

Spotted frogs and tiger salamanders in particular may be affected by fish stocking (Patla 2000). Once widespread and common, many amphibian species have experienced dramatic population declines. Additional amphibian species are likely to be listed as USDAFS sensitive species and/or petitioned for Endangered Species Act listing.

Promote natural fisheries by not stocking in naturally fishless waters or stocking non-native fish in any waters.

Vegetation Management

Purpose and Need

Goal 2.1 of the Forest Plan calls for maintaining adequate habitat for wildlife, goal 3.2 calls for recovery of Endangered Species, and goal 3.3 seeks to prevent sensitive species from becoming federally listed. Vegetation management is necessary to maintain and enhance habitat capable of supporting sustainable wildlife populations. Vegetation treatments can benefit the recovery of threatened and endangered species. For example, a prescribed fire, either natural or management ignition, could enhance snowshoe hare habitat and benefit Canada lynx.

Improving the vigor of big game winter, parturition, and transitional ranges encourages elk to remain on native range longer in fall and to leave the feedgrounds earlier in spring. Reducing elk dependence on supplemental feed reduces disease transmission risks, amongst the elk and to other species including livestock, thereby increasing the overall herd health.

In 1995 and 1996, WGFD and Forest Service personnel inventoried approximately

14,500 acres (over 25 locations) in the Greys River watershed. Much of the shrubland vegetation had reached near-climax successional stages; aspen and mountain shrub communities were dense and overmature, with a large percentage of dead and dying plants. These important habitats are converting to conifer forest and sagebrush types. Unless succession is set back, watershed function and health, along with big game winter and transitional range values will continue to decline unless a watershed scale mosaic of seral stages is provided.

Initiate a program to maintain and enhance existing big-game habitat while improving the vigor of winter, parturition, and transitional ranges. The program should encourage elk to remain on native range longer each fall and to leave the feedgrounds as early as possible each spring as outlined in the WGFD's Brucellosis-Feedground-Habitat Program. A reduced feeding program would benefit the vegetation and other resources and decrease disease transmission risks.

Potential projects exist within all sixth order watersheds of the assessment area. Those sixth order watersheds of highest priority are Little Greys, Sheep Creek, and McCain Creek. Of the priority one hydrologic units, Sheep Creek is the lowest priority due to its proximity to Forest Park Feedground. The concern is treating insufficient acres to properly distribute feedground elk, which would inhibit rather than benefit vegetation regeneration.

Table 4.1. Aspen, Non-forested, and Riparian Vegetation Types in Crucial Big-Game Winter Range (CWR) and Elk Parturition Range (PART.) by Hydrologic Unit

HUC	ACRES CWR	ACRES PART.	PERCENT CWR	PERCENT PART.	PRIORITY
Alpine	1443	1945	28	14	2
Bear Creek	1830	1955	30	29	2
Deadman Creek	2664	2937	29	25	3
Deer Creek	361	3063	15	30	3
Little Greys	2152	4616	46	41	1
Lower Long Gulch	335	1801	15	15	3
McCain Creek	711	5102	58	57	1
Meadows Creek	759	1292	15	11	4
Mink Creek	5	0	100	0	4
Moose Creek	3113	4525	32	19	3
Murphy Creek	151	979	10	25	3
Sheep Creek	784	1046	62	57	1
South Fork	516	1408	30	15	3
Spring Creek	1662	4194	41	22	2
Three Forks	896	1395	17	13	4

* Priority based upon a subjective analysis of acreage of aspen, non-forested, and riparian vegetation; percentage of these vegetation types within the hydrologic unit; proximity to an elk feedground, big-game staging areas, and WGFD vegetation inventories. The Blind Trail Fire burned only small amounts of these vegetation types within the Deadman Creek, Little Greys River, and South Fork hydrologic units.

Greys River Peninsula Habitat Enhancement

Purpose and need

Goal 2.1 of the Forest Plan calls for maintaining adequate habitat for wildlife, goal 3.2 calls for recovery of Endangered species, and goal 1.1 seeks for communities to continue or gain greater support by re-establishing historic elk migration routes, thereby providing increased viewing and hunting opportunities. Improve the vigor of elk winter range, encouraging elk to winter on native forage.

a) Consider *restricting human activity* on the Greys River peninsula from November 15 to April 30 for protection of wintering elk and to provide a secure foraging area for bald eagles.

b) *Initiate prescribed fire on south slope of Bradley Mountain* across from Alpine. *Install an interpretive sign* along the permitted snowmobile trail adjacent to Alpine with the educational opportunity to see elk wintering naturally. Sign(s) could explain the importance of natural winter range and disadvantages of an artificial feeding program.

Amphibian Breeding Site Restoration

Purpose and Need

Goal 3.3 of the BTNF Land and Resource Management Plan states that sensitive species are prevented from becoming federally listed Threatened species. The goal is to be accomplished by providing suitable and adequate amounts of habitat. As with many amphibian species, Columbia spotted frogs have experienced sharp population declines in parts of their range; including localized declines in parts of northwestern Wyoming (Patla 2000). Once widespread and common, many amphibian species have experienced dramatic population declines. There are no records of leopard frogs or boreal toads in the Greys River District (Patla 2000); an unidentified toad was observed within the Alpine town limits (T. Bills pers. comm).

Restore the Mill Hollow spring to its natural condition. Patla (2000) reports tiger salamander and chorus frog breeding in Little Jenny Lake. If restored, breeding habitat may be provided for other amphibian species including western boreal toad and the sensitive Columbia spotted frog. The Mill Hollow spring has been developed as a culinary water source and is currently permitted to the Town of Alpine. Following an E. coli outbreak, attributed to the spring, the U.S. Environmental Protection Agency prohibited the spring's use for culinary water. It is unlikely the Environmental Protection Agency will again approve the spring as a municipal water source.

> A potential scenario for the project would involve cooperation with the Town of Alpine and the Lake View Estates subdivision/water district. Alpine is interested in additional water sources, and has continued using Mill Hollow spring for non-culinary purposes. Lake View has permits for a spring and a well on national forest system lands adjacent to the Alpine water tank. Lake View Estates would like Alpine to develop a county approved (pre-Alpine incorporation) access road. The Lake View spring is not properly maintained and likely poses health risks. Lake View has also failed to remove unused tanks and other materials from the permit area after being asked by the Forest Service in 1998. With assistance from the Forest Service, Alpine and Lake View may be persuaded to work a deal where: Alpine constructs the access road for Lake View Estates, in return Alpine obtains the water rights and permit to

Lake View's well and Lake View joins the Alpine water system. If Alpine desires a non-culinary use permit for the spring currently permitted to Lake View, the proposed action is analyzed through the NEPA process. The Mill Hollow spring permit is voided, following which the spring is restored to natural conditions.

Little Greys River--Payson's milkvetch enhancement

Purpose and Need

An early pioneering species, Payson's milkvetch disappears a few years after initial vegetation disturbance. Elimination of fire, timber harvest, and other disturbances result in population declines and may eliminate Payson's milkvetch habitat (Spahr et al. 1991). Periodic disturbances are necessary for the long-term survival of the species.
Use prescribed fire to promote Payson's milkvetch population expansion; milkvetch populations may be unable to persist without disturbance. The Waterdog Lake population, in particular, will probably decline unless a disturbance creates new habitat; Fertig and Marriot (1993) reported individual plants of this population to be in poor condition.

Transportation System

I. Inventory and Monitoring

Purpose and Need

To decrease sedimentation into waterways to acceptable levels.
Identify specific sources of sedimentation to Greys River and Little Greys River from the adjacent roads. Complete road surveys for both.

II. Field Projects and Planning

Purpose and Need

To increase public safety, stabilize road surfaces, and allow for fish passage where necessary.
a) *Provide dust abatement on the Greys River road*, with top priority from Alpine to Murphy Creek Campground, where use is heavy and sedimentation to the river is occurring, as well as where other campgrounds and popular semi-developed camps are located along other portions of the road corridor.
b) *Provide large culverts and bridges where possible*, as well as better ditches, to move water from spring run-off across roads without saturating them.
c) *Assign road management objectives* and maintain to appropriate levels.
d) *Replace culvert* at Shale Creek Road to allow fish passage.

Purpose and Need

To move Greys River Road out of floodplains and riparian areas near the river. This problem exists in several locations in the lower section as well as longer stretches in the upper end of the drainage. A number of similar activities addressing these issues were accomplished in the Lower Greys Reconstruction Project during 2000.

Road relocation or realignment, or the construction of retaining structures has been noted in the following locations:

- Little Greys bridge, mile 7.7. Crossing could be moved slightly upstream to avoid outside of meander of the main Greys River. The bank is much more stable since Lincoln County placed boulders along curve. Additional boulders upstream of the bridge on the main Greys might also help.

- Pearson Creek, mile 22.5. Road is slumping into river. It is more cost-effective to add a little gravel annually than to try stabilizing the small amount of slump currently occurring.

- Twin Creeks, mile 35.4 to 36.2 Road against river. Dikes constructed to force river away from road.

- Box Canyon Creek, mile 47.0 to mile 47.9. Relocate road to the east, avoiding riparian willows and sharp narrow curves.

- Clear Creek south, mile 52.1 to 53.6. Conduct analysis and evaluate alternatives to relocate road out of the narrow river gorge. Might tie in with Poison Meadows road.

Purpose and Need

To maintain roads according to associated recreational standards for their area, in order to offer a diversity of recreation settings to the public.

Passable for Passenger Sedans:

Greys River Road
Little Greys River Road
Murphy Creek Road
Blind Bull Road.
lower end of Bear Creek Road
North Three Forks Road
Meadows Guard Station access
McCain Meadows
Spring Creek
Stump Lake

Passable for High-clearance Vehicles:

Deadman Creek Road
Little Elk - Porcupine Road.
Spring Creek
Kinney-Shale Creek loop (may become a one-way road from Kinney Creek end, Shale Creek being closed if Greys River Road is relocated)

Recreation

I. Forest Plan Amendment Recommendations

Purpose and Need
To realign forest plan land allocations to reflect desired conditions on the ground.
Redefine DFCs to reflect a range of settings from developed to primitive, and plan for compatible kinds of resource use within each. Perhaps this should be done on a watershed basis, as many other national forests have done.

Entire corridors of wild/scenic river candidates might be better mapped as DFC 3. Road densities are unrealistic for existing DFC 3 along Greys River.

DFC 2A should coincide with areas of high-quality backcountry recreation and include those trails that give primary access to them. See Map 2.3.

DFC 2B should coincide with the areas identified as suitable and desirable for improved ATV/trailbike use. Need to revisit travel management plan.

II. Inventory and monitoring

Purpose and Need
To establish trends in roadside or dispersed camps.
Select a few representative roadside camps and redo the monitoring. Campsite condition monitoring has not been done since the mid-90s.

Purpose and Need
To have a clear understanding of visitor use year-round.
Establish a counter on the Greys River road and perhaps a few other places in the summer as well as in the winter.

Purpose and Need
To create a baseline of backcountry campsites as required in the Forest Plan.
Inventory some of the more popular backcountry campsites such as Corral Creek Lake.

Purpose and Need
To analyze possible additions to the motorized trail system for travel management plan.
Inventory level 1 and 2 roads.

Purpose and Need
To be in compliance with regional standards as per INFRA schedule.
Complete trails and developed recreation condition surveys.

Purpose and Need
To provide for appropriate levels and diversity of outfitter-supported recreational experiences. Using the 1999 determination of public need, it appears that opportunities for increased service by outfitter guides are not needed at this time. We have about the

right number of hunting outfitters based on use of authorized service days, although it is hard to argue that people cannot safely access the area without them. There appears to be little additional public need for summer use days. Winter use appears optimum at about the 1100-1200 service day level. In the season of 1997-98, more use was authorized, and not used by the outfitters.
Monitor, and for now maintain current levels of fall and spring big game and trophy hunting. Analyze and determine needs for summer and winter use levels every 4 years (done in 2000).

III. Field Projects and Planning

Purpose and Need
To accommodate increasing recreation use on roads and at established developed and dispersed campsites along major roads.
Projects*: more frequent road maintenance, dust abatement, placing gravel, traffic barriers, and control of expansion at dispersed campsites*.

Purpose and Need
To prevent expansion, and control or eliminate current infestations of noxious weeds.
Continue weed control at campgrounds, trailheads, pulloffs, dispersed camps and along roadsides.

Purpose and Need
To recover vegetation and soil in damaged dispersed campsites. *Temporarily close some dispersed camps, or fence off parts of campsites* especially near the river; this has been done effectively at Squaw Creek flat and other areas with sections of buck-rail fencing. Dead Dog Creek, Kennington Flat, Porcupine Creek, Deer Creek are priority locations that we know of; see inventory and monitoring needs above.

Purpose and Need
To achieve consistency of management across Forest user groups.
In grazing AMPs, *address sheep camp locations* relative to system trails, litter, dead animals, discarded food and other bear attractants, camp structures, salt blocks, and bedding areas -- if public can't leave litter and salt on the ground then permittees should not. *Evaluate need for permanent structures* such as unloading ramps – outfitters complain that they can't have permanent camp facilities yet other permittees do.

Purpose and Need
To reduce sedimentation in waterways and to preserve trail tread and user safety.
Add/maintain drainage and erosion control structures on system trails. Each year some trails are improved through heavy maintenance and relocation. Maintain and improve trails to meet needs and standards. Many trails do not need much work, since they get low use and are compatible with the remote and primitive settings where they are found. Others are not in a condition that matches the use level or kind of use they get.

TRAIL	IDENTIFIED NEEDS AND PROPOSED CHANGES
Skull Creek	Reconstruct first two miles, move from landslide and bog areas. Low priority. Manage for non-motorized uses.
Trail Creek	Rebuild parts of tread that have become indistinct and too steep. Blaze and sign. Low priority. Manage for non-motorized uses.
Middle Ridge	Clearing and tread maintenance. Medium to high priority.
McCain Creek	Low use, fairly well marked. Blazes in place, a few need replacement. Part of this trail system and link to Bull Hollow is a potential addition to the OHV trail system, pending IDT analysis.
Bailey Lake	High use trail, standard maintenance and clearing. Construct bog bridges near the lake. High priority.
Telephone Pass	Maintenance, hardening and clearing. Med-high priority. Because of soil and watershed concerns we are considering management of trail for non-motorized uses.
Little Greys	Reconstructed a few years ago. Maintenance and clearing, high Priority, make sure bog bridges are in good repair.
Hot Foot Creek	Marking; treadwork on steep stretches. Medium priority.
Stump Lake	Trail in good condition to Stump Lake, section above lake to top of Middle Ridge could use treadwork and clearing. Low priority.
Murphy - Squaw	ATV trail, though steep in places. In good condition and easy to follow (for hikers). Some reconstruction needed on steep pitches. Medium priority. See map 4 for potential additions to OHV trail that would create a loop with North Fork Murphy Creek (if landslides and watershed/wildlife concerns can be addressed).
White Creek	Ideally, move trail out of creek bottom where bogs and springs are. Upper end needs marking.
Deadman Peak	Good trail, needs directional signing at bottom. Trail not suitable For motorized traffic; we propose to close this to trailbikes.
Wyoming Range NRT	In pretty good shape for most of the way, top of Blind Bull could use some marking and new signs (both directions). Some steep pitches on segment just east of Pickle Pass.
Moffat Creek	Retain as primitive, low-use trail.

Black Canyon	Retain as primitive, low-use trail.
Meadow Creek	Trail is in good shape and easy to follow, has been flooded by Beaver dams in lower end. Clearing and marking, annual maintenance. Lower end to Way Trail considered for north end of new OHV loop; upper end to be managed for non-motorized use.
North Fk Sheep Cr	New blazes, markers, and some treadwork. Indistinct and hard to follow.
Sheep Creek	Trail is in excellent condition. A few small bogs need to be drained.
Buck Creek	Retain as primitive, low-use trail.
Bear Creek	Clearing and treadwork needed annually; high priority trail. Lower part to be managed for part of OHV trail (see map 4) and upper end to McDougal Pass managed for non-motorized uses.
Elk Creek	Retain as primitive, low-use trail. Blazing and marking probably all that is needed.
Lake Barstow	Work done in 2003 fixed most problems. Manage for durable OHV trail.
Marten Creek	Some relocation in upper end, otherwise trail in good shape, steep though.
Crow Creek	Excellent trail, no needs. Could put footlogs in at lower end for creek crossings.
Corral Creek	Trail needs tread work and waterbars installed on west 5 miles. May want to look at trail bridges on fords, especially the first one. To be managed for non-motorized uses beyond road closure.
Way Trail	Parts of this trail to be managed for OHVs but sections between Lost Creek and Meadow Creek and south of South Three Forks Creek is not suitable for vehicles and will be managed for non-motorized use.
Box Canyon Creek	Treadwork and slough removal in talus areas, may look at relocating steep pitches.
Spring Creek	Good trail, no needs other than clearing and maintenance. Some of this trail could remain open to OHVs (first ford) but the

	upper end is proposed for non-motorized use. More information and analysis needed to determine road system in this area and which roads, if closed, are suitable for trails.
Mink Creek	Retain as primitive, low-use trail.
Wyoming Peak	No needs (best trail on the forest). Proposed to manage as a non-motorized trail; trailbike use is causing erosion.
Boco Creek	Retain as primitive, low-use trail.
East Fork	Retain as primitive, low-use trail.

Purpose and Need
To respond to the rapid growth of All-Terrain Vehicle traffic. Some of the routes identified are shown as "open" trails but they are simply not suitable for wheeled vehicles due to terrain, soil type, and other obstacles. Some of the "open" trails were identified with motorbikes in mind; we need to make a distinction between trailbike trails, that are narrow, single-track trails, and ATV routes, that really should be designed and constructed similar to roads.
Revise current travel management plan, especially regarding backcountry trails open to off-road vehicles. Some of the routes identified are shown as "open" trails but they are simply not suitable for wheeled vehicles due to terrain, soil type, and other obstacles.

- Find and maintain more suitable routes for ATVs
- Analyze routes for deletion from the open route system under a new travel plan
- More effectively close the areas that are not open—through signing, barricades, increased enforcement.

Potential routes that may be suitable for addition to motorized route system – some for ATVs and some for bikes only:

- Squaw Creek (3184) to North Murphy Creek (3024) Loop
- Lower Cabin Creek Road (10256) to Covey Cutoff Trail (3081)
- Bear Creek (10214) to North Three Forks Road (10043)
- Little Greys Timber Sale Road (10047) to Blind Trail Road (10334)
- Ridge Creek Road (10366)
- West Bailey Creek Ridge Oil Well Road (currently not on the system)
- Bull Hollow (3192)
- Little Jenny Lake Road (10025) to Mill Hollow Road (10138C) Loop
- Mill Hollow Road (10079A)

Routes not suitable for motorized use, to be analyzed for deletion from the open route system under a new travel plan. These trails are currently open to motorized use

on the existing travel plan but are not suitable (or possible) for ATV use and resource damage has occurred on them. Also, continued motorized use in some of these areas is incompatible with desired conditions stated elsewhere in this document.

- Upper Bear Creek Trail (3085)
- Upper Corral Creek Trail (3179)
- Covey Cutoff Trail (3081) above the existing timber sale roads when an ATV loop exists.
- Deadman Peak Trail (3076)
- Dry Creek Lake Trail (3182) – on west side of Salt River Range, but access to LSA
- Sheep Pass Trail (3171) D1 side already closed
- Spring Creek Trail (3042)
- Telephone Pass Trail (3075)
- Trail Creek Trail (3069) – on west side of Salt Rivers but gives access to LSA
- Way Trail (3079)
- Wyoming Peak Trail (3041)

Purpose and Need
To provide for winter safety and customer service while protecting winter ranges for moose and elk.
(a) *Continue to groom and sign* snowmobile trails in crucial winter range to keep people on trail.
(b) *Evaluate two potential new marked, but not groomed, snowmobile routes*. They have not been analyzed sufficiently at this time to determine whether to designate them as snowmobile trails.

- Little Greys/Blind Bull Loop--8 miles on Greys River District, 7 Miles on Big Piney District, marked, not groomed
- Bear Creek/North Willow Creek/Strawberry--22 miles marked, not groomed

Purpose and Need
To protect and enhance the scenic and recreational values of the watershed, as prescribed under DFC3 in the Forest Plan.
Complete NEPA and recommend Greys River for Recreational River status (suitability study has been done in 1995).

Purpose and Need
To accommodate increased visitor use along the Greys River Road.
(a) *Provide day use sites* near north end of Greys River (Gillis Flat, Murphy Lake, Squaw Creek Flat, Forks; convert Bridge CG to picnic site and boat launch area).
b) *Provide centralized facilities* for users up and down the river. Desired facilities include RV dump station, water, garbage disposal. Would like to find a way to charge a fee for this.
c) *Provide at least two suitable sites for reservation by large groups* (up to 100) for day use or camping.

Purpose and Need
To provide a much-appreciated service for young families as a segment of summer visitors and for winter recreationists as well.
Continue to manage guard stations for public rentals.

Purpose and Need
To control erosion, protect vegetation, provide better customer service and access to forest system trails.
Provide adequate trailhead parking and signing. Trailheads are listed below with priority level for improvements.

Trailhead name, location	Needs and priority
Pearson Creek	High priority for a small trailhead near Moose Flat Campground, with turn-around for trailers.
Bailey Lake	Not developed; signs mark trailhead. Larger parking area apart from camping sites; gravel surface. High priority.
Bear Creek	Parking with surface, turn-arounds, hitch rails, signs. High priority.
Lake Barstow	Surfaced parking, signs. High priority.
Box Canyon Creek	Parking with surface, away from campsites (north side of creek). High priority.
Spring Creek	Develop parking on bench. High priority.
Wyoming Peak	Surfaced parking area, signs. Medium priority.
Way Trail (South end)	Surfaced parking area and signing. Medium priority.
Little Greys	Surfaced parking area. Low priority.
Hot Foot Creek	Need a small surfaced parking area. Low priority
Murphy/Squaw Creek	Surfaced parking area.
Way Trail (North end)	Surfaced parking area, signs, culvert.
White Creek	Existing developed trailhead is fine, but access road is located on unstable slope with springs. May consider moving trailhead to east side of river.

Middle Ridge (South end)	Surfaced parking area away from campsites.
Covey Cutoff	Parking area moved away from Guard Station and surfaced.

Purpose and Need
To increase capacity and services for groups, to improve sanitation and reduce dispersed use traffic.
(a) *Renovate Bridge Campground* as a campground and day use/boating site.
(b) *Create a larger campground* in the lower Greys River. This campground could be located at Squaw Flat or on Gillis Flat. Evaluate these sites and prepare a proposal to construct the new campground. Also the construction of a new campground near Wolf Creek in the Snake River Canyon may help meet the needs for this kind of camping.
(c) *Operate Lynx Creek Campground as a no-fee campground*. Remove facilities as they become unusable, then allow the site to be used for semi-developed camping and picnicking.
(d) Murphy Creek Campground. Reconstructed in 1997. This campground has the highest potential for expansion and increased development of the existing sites in the corridor. A need has been identified for a *group reservation site and an RV dump station somewhere in the Greys River corridor.* The logical place for both is at Murphy Creek Campground. The flat north of the campground is the proposed location for the RV dump station, either along the entrance road or on the east side of the Greys River Road. The fence, water system and road could be extended (or a separate road constructed from the south) and a large group site can be constructed just south of the existing campground fence. There is also room to double the size of the campground to the south.
(e) Moose Flat Campground. There is opportunity to *construct a group site* at the north end of the campground with a minimum investment.

Purpose and Need
To enhance visitor experience while sharing stewardship/management messages.
Evaluate, develop and install interpretive signs as follows:

5.0S	Higby Slide	Geologic interpretive sign
6.9S	Wildlife Wallow	Interpretive sign
8.9W	Large Slide	Geologic interpretive sign
15.5W	Mile Flat	Moose winter range, otter, osprey
26.4W	Blind Bull	Beaver, ducks, moose habitat
44.2W	Old Sheep Corral	Historical interpretive sign
45.9W	Corral Creek	Wildfire, wildlife

Purpose and Need
To enhance recreational experience and provide customer service.
Fence undeveloped campsites that get heavy season-long use to keep cattle out.

Purpose and Need
Reduce resource damage along river from dispersed recreation and traffic, without closing opportunities for dispersed camping in desirable locations.

Specific management actions that address inventoried campsite impacts follow.

Vehicle access. Closure of duplicate access roads to campsites, gravel surfacing in wet areas, and traffic barriers are options for repairing those campsites that show unacceptable damage from vehicle use.

Camp and road location. Although some sites are very close to the river, they could be made acceptable through use of traffic barriers that would force vehicles off the river banks.

Loss of ground vegetation. Traffic barriers could be helpful, especially where tree cover is not continuous. Some camps in denser forest may not be as easily revegetated.

Developments. User-built structures such as wire, plastic twine, nails driven into trees, plastic tarps, and structures in a state of disrepair are dismantled as part of routine campsite cleanup.

Site cleanliness. Routine cleanup of litter at campsites; distribution of litter bags at entrance station, and/or placement of a centrally located dumpster.

Moose Creek aspens, view of Salt River Range

TABLES OF PROPOSED MANAGEMENT ACTIVITIES

Table 4.2
Forest Plan Amendment recommendations

LOCATION	AMENDMENT	REASON
BTNF	Revise cover and security definitions	Size, distance from open rds, veg. characteristics
BTNF	Review snag mgt guideline	Ascertain effectiveness
Assessment area	DFC 3	Road densities unrealistic along Greys
Assessment area	DFC 2A	7 areas include non-motorized recommendations
Assessment area	DFC 2B	To coincide with routes potentially suitable for motorized use

Table 4.3
Monitoring and Inventory recommendations

LOCATION	ACTION	REASON
Assessment. Area	Strategy for & schedule to inventory cultural sites.	Susceptible to damage.
Assessment area	Evaluate cultural sites for significance and eligibility	Avoid loss of significant resources
Assessment area	Identify traditional use areas w/tribes	Comply w/EO 13084
IWWA problem areas	Develop rehabilitation measures	Establish funding priorities for POW
Assessment area	Establish reference stream reaches	Assess watershed condition
Assessment area	Update watershed condition assessment	Define watershed conditions and priority work areas
Assessment area	Inventory stream habitat at 5 or 10 yr. rotation	Maintain fishery at or near potential; identify opportunities
Assessment area	Update R1/R4 Stream Inventory	Achieve 90% natural streambank stability
Historic sheep driveways	Conduct inventory to assess extent and condition.	To develop reclamation plans
Assessment area	Conduct Soil Quality Monitoring	Determine soil condition on selected projects (see forest plan)
Old Fires	Conduct effectiveness monitoring of burned area rehabilitation.	Determine effectiveness of burned area rehabilitation (see forest plan)
Assessment area	Complete understory inventory/GIS coverage	Increase accuracy in decision-making
Assessment area	Establish monitoring transects	To collect long-term trend data
Assessment area	Identify all elk calving areas	For use in travel planning
Assessment area	Identify wolverine denning habitat	For use in a winter travel plan
Assessment area	TES surveys—prioritize those likely to occur	To create mgt plans
Assessment area	Inventory & monitor rare amphibians (W. boreal toad, northern leopard frog)	Baseline info for possible ESA petitions
Assessment area	Inventory boreal draba	Document trends in sensitive plants
Trunk roadways	Identify sources of sedimentation	Protect river integrity

Field Project and Planning recommendations

Table 4.4 I. General recommendations

LOCATION	ACTION	REASON
Significant Historic sites	Stabilize & restore structures	Preserve historic resources
Assessment area	Develop vegetation management plans	Include timber and prescribed fire
Assessment area	Incorporate sediment abatement requirements in road mgt objectives	Protect water quality
Roads in assessment area	Maintain or close/rehabilitate roads	Address watershed stability
Upper, Middle, Lower Greys	Conduct watershed assessments	Identify opportunities to achieve desired conditions
Roads in assessment area	Maintain culverts to prevent blockage	Provide fish passage for all life stages
Assessment area	Reintroduce fire	Decrease woody species
Assessment area	Chemically or biologically control weeds	Control invasive plant species
Assessment area	Include weed-free requirements in contracts	Prevent new weed infestations
Assessment area	Create 36,000 acres of species-specific stand initiation over 10 years	To move forest toward Properly Functioning Condition & Vegetative/Fire Condition Class
Assessment area	Increase and maintain aspen/whitebark pine in all seral stages	Provide habitat for many species & improve watershed conditions
Assessment area	Retain live and dead trees/ coarse woody debris during timber and fuels management	Provide density and snag availability for habitat
Assessment area	Create winter travel plan	Avoid conflicts with wildlife and among recreation user groups
Assessment area	Decommission unneeded roads	Maintain big game security areas and protect watershed conditions
Big game habitat	Enhance winter, parturition and transitional ranges	Decrease disease transmission risks from feedgrounds
Roadways	Improve road drainage systems	Reduce erosion and road failures
Campgrounds, trailheads, pulloffs, dispersed camps	Continue weed control	Prevent expansion, control current weed infestations
Greys River	Complete NEPA/ recommend for Recreational River status	Enhance scenic and recreational value of watershed
Assessment area	Maintain current levels of outfitter activity	Provide for sustainable levels & diversity of services
Trailheads across assessment area	Provide adequate parking and signing	Control erosion, protect vegetation, customer svc
Sites along roads	Develop and install interpretive signs	Share stewardship messages
Dispersed sites across assessment area	Close duplicate access roads, gravel wet areas, install traffic barriers, routine cleanup	Reduce resource damage

Heavy-use dispersed sites	Fence cattle out	Enhance recreation experience
Assessment area	Assess current and potential routes for OHVs	Provide for user safety, protect resources

Table 4.5 II. Specific Area recommendations

LOCATION	ACTION	REASON
Historic Sheep Driveways	Develop reclamation plans	Improve soil productivity
Poison Meadows to Mt Bradley and Grayback	Increase ground cover	Improve soil productivity
BirchCr—Star Peaks White Cr—Man Peak	Complete NEPA	Determine feasibility of grazing authorization
Deadman, Lower Long Gulch, Meadows, McCain, Murphy, Three Forks	Revise Allotment Management Plans	Improve subwatersheds identified as non-functional
Forest Park Feedground	Restore riparian area	Improve riparian condition
North side of Tri-Basin	Reconstruct fence	Control livestock movements
Poison Meadows Rd (10217) Shale Crk Rd (10216)	Provide better drainage or possible reroute	Provide road passage and safety; reduce erosion
Communities adjacent to assessment area	Continue bear and mountain lion education	Reduce human-wildlife conflicts
Waterdog Lake	Prescribed fire	Promote Payson's milkvetch
Greys River peninsula	Restrict human activity from 11/15-4/30	Protect wintering elk and foraging eagles
Bradley Mtn	Prescribed fire & interpretive signing	Increase winter range for elk; explain advantages of natural feeding
Mill Hollow Spring	Restore to natural conditions	Provide amphibian habitat
Alpine—Murphy Crk CG	Provide dust abatement on Greys R. Rd	Decrease sedimentation
Shale Crk road	Replace culvert	Allow fish passage
Kennington Flat, Little Greys bridge; Pearson Crk; Twin Creeks; Box Canyon; Clear Crk	Relocate or realign out of riparian areas	Increase floodplain width, reduce erosion, rehabilitate riparian corridor
Dead Dog, Kennington Flat, Porcupine Crk, Deer Creek	Temporarily close some dispersed camps, or parts thereof	Recover vegetation cover and soil composition
Gillis Flat, Squaw Flat, Forks, Bridge, Moose, Lynx	Provide day-use sites, & group reservation sites	Accommodate increased visitor use
Murphy or Moose CG	Provide centralized RV dump, water, garbage	Address dispersed user requests
Guard Stations	Continue public rentals	Provide for winter safety and access for special needs
Little Greys—4th Crk—Blind Bull; Bear Crk—Willow or Strawberry	Evaluate marked, not groomed snowmobile routes	Improve customer service for increased winter rec use

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